THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[Registered as a Newspaper.]

Vol. XXX. No. 759.] LONDON, NOVEMBER 27, 1877. [29th Year.] Price 6d.

ESTABLISHED 1782.

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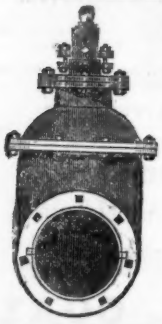

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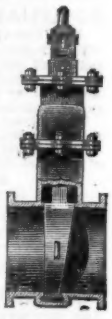

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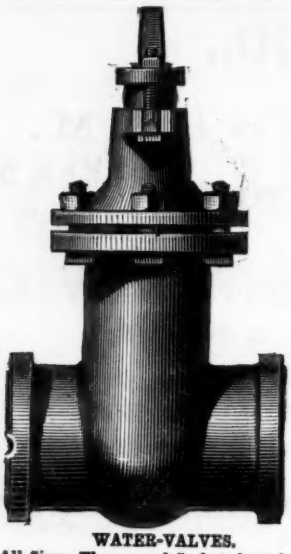

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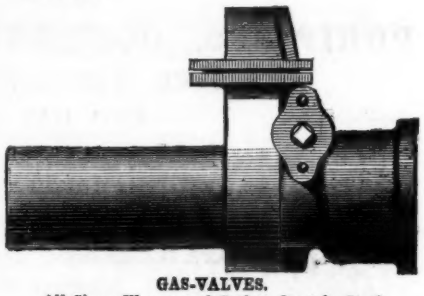

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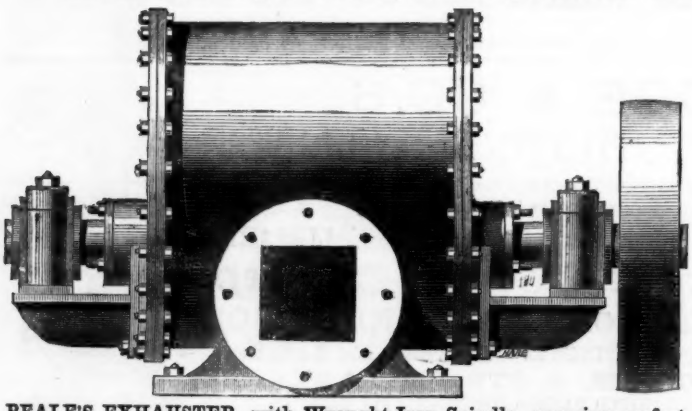

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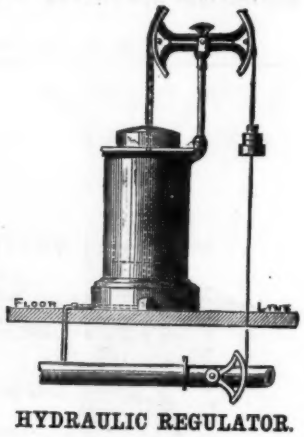

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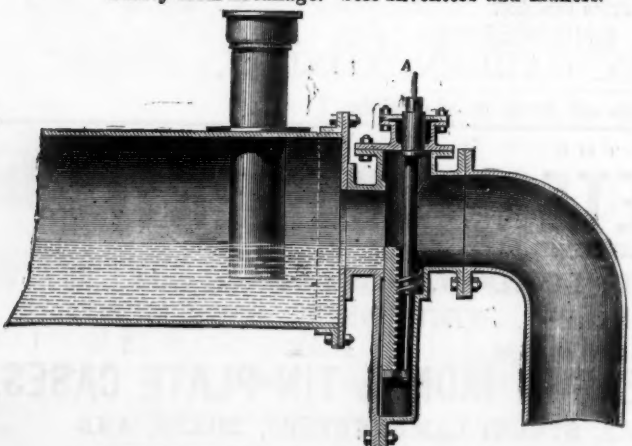

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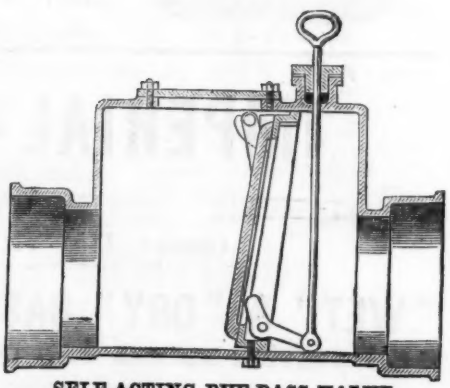

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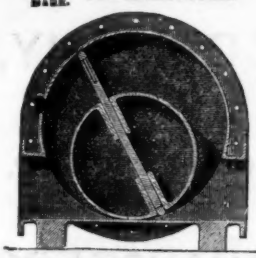

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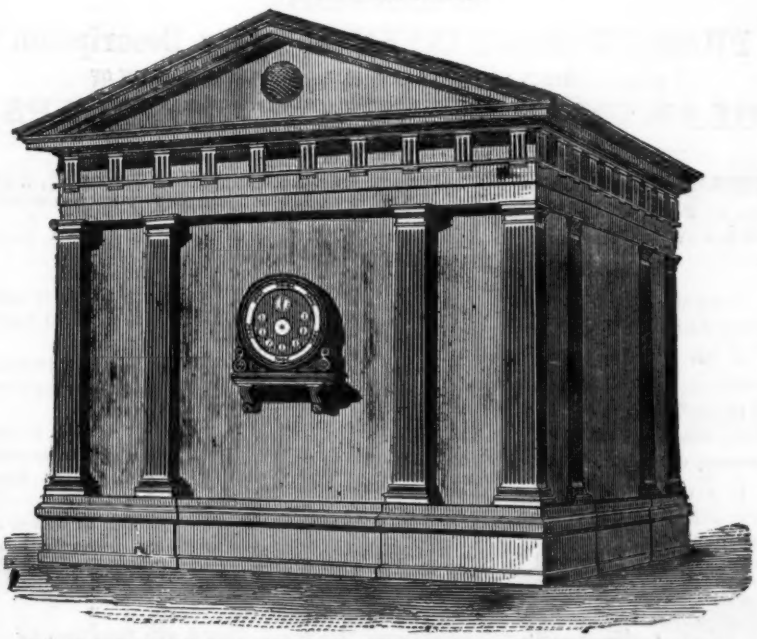

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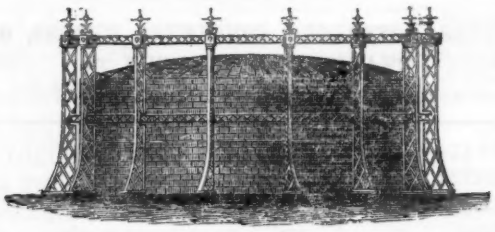
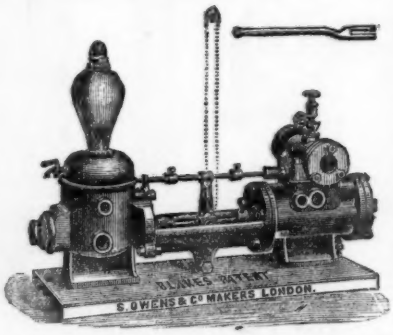


THE HORSELEY COMPANY,
LIMITED,
TIPTON, STAFFORDSHIRE.
LONDON OFFICE:
6, WESTMINSTER CHAMBERS, VICTORIA STREET,
GAS ENGINEERS, IRONFOUNDERS, &c.,
MANUFACTURERS OF
GASHOLDERS, WROUGHT AND CAST IRON TANKS, CONDENSERS, PURIFIERS, SCRUBBERS, MAINS, RETORT-LIDS, PLAIN AND DISHED, LAMP-POSTS, PIPES,
AND ALL REQUISITES FOR EITHER
GAS OR WATER WORKS;
ALSO
MAKERS OF ROOFS, BRIDGES, &c.

S. OWENS & CO.,
WHITEFRIARS STREET, LONDON, E.C.,
HYDRAULIC ENGINEERS,
AND MANUFACTURERS OF
PUMPING MACHINERY of every Description.
SOLE LICENSEES AND MANUFACTURERS FOR GREAT BRITAIN OF
BLAKE'S PATENT STEAM-PUMPS,
More than 10,000 in use,
ESPECIALLY ADAPTED FOR USE IN GAS AND CHEMICAL WORKS, FOR PUMPING TAR, WATER, AMMONIACAL LIQUOR, ACIDS, &c.
The following are some of the prominent advantages of the BLAKE PUMP:—

It will start at any point of stroke.
It has no dead point.
It works fast or slow, with the same certainty of action.
It is economical. Has a lead on the slide-valve.
It is compact and durable.



It is interchangeable in all its working parts.
It will deliver more water than any other pump.
It is made of best materials in the most workmanlike manner.
Can be worked at 20 strokes per hour, or 200 strokes per minute.

This Illustration represents Boiler-Feed Pumps, Sizes Nos. 1, 2, and 3, with Hand Lever for working Pump when Steam is not available.

SOLE MANUFACTURERS OF
MANN & OWENS
IMPROVED PATENT GAS-VALVES.

PRICED LISTS AND FULL PARTICULARS FURNISHED ON APPLICATION.

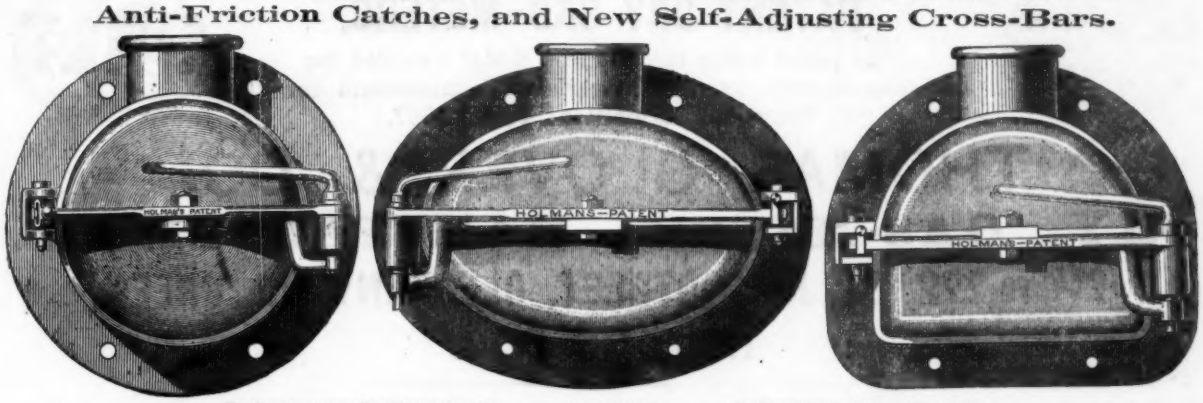
TANGYE BROTHERS AND HOLMAN,

10, LAURENCE POUNTNEY LANE, LONDON, E.C.

SOLE MAKERS OF MORTON'S PATENT SELF-SEALING RETORT-LIDS,

WITH HOLMAN'S PATENT ECCENTRIC FASTENINGS,

Anti-Friction Catches, and New Self-Adjusting Cross-Bars.



Instantaneous Sealing effected. No Luting. No Duplicate Lids required.

Holman's New Self-Sustaining Cross-Bar ensures freedom of Joint, and maintains parallel position of the Lids.

Since their introduction in 1869, these Patent Retort-Lids have been thoroughly tested (rigid cast iron is now successfully employed), being now in use in nearly all the principal Gas-Works in London and the Provinces.

Messrs. T. B. and H. are now making the "Morton's Self-Sealing Lid" of the SAME FORM OR SECTION AS THE RETORT ITSELF (see Illustrations above), instead of, as heretofore, bringing the Mouthpiece from the D or Oval at back to Circular in front.

D and Oval Morton's Lids have now been working satisfactorily for the past two or three years, both in this country, on the Continent, and in the United States of America. Among others they have been adopted by the following Gas-Works:—

The Gaslight Company's Works, Fulham; Ditto, Bromley-by-Bow; Ditto, King's Cross; Ditto, Shoreditch.
And also in the Gas-Works at Richmond, Maidstone, Gloucester, Glasgow, Portsea, Roubaix (France), The Hague (Holland).

HUNT'S PATENT EQUILIBRIUM GAS-GOVERNOR.

In this Governor a Throttle-Valve is substituted for the ordinary suspended Cone, all external communications being avoided by placing the Lever or Radius Arm (shown in the drawing) inside the Valve-Chamber upon the Disc. The Disc is carried upon steel centres, upon which it is accurately balanced and turns freely. The friction in working is thereby reduced to a minimum. This Governor is extremely sensitive to alterations of inlet or outlet pressure, and renders a large actuating holder unnecessary.

The principal advantages of this arrangement over the ordinary form of Governor are as follows:—

Its sensitive action prevents oscillation.

It is self-adjusting—*i.e.*, it maintains a steady pressure under variations of inlet pressure or a fluctuating consumption.

The inlet to Gasholder being contracted to the smallest possible dimensions, all danger from leakage through insufficiency of seal, tilting, &c., is entirely avoided.

The valve portion being separate from the holder, it can be handled and fixed like an ordinary Slide-Valve direct in the main; and the holder can be placed at any convenient distance immediately above it. The cost is thus materially reduced, and the inconvenience of heavy lifts done away with.

There are no working parts likely to get out of order.

These Governors have been adopted by many leading Gas Companies, among whom are the following:—

The Gaslight and Coke Co. (9), The London Gas Co. (3), and at Abergavenny, Arundel, Birmingham, Cannes (France), Devonport, Dursley, Exeter, Guernsey, Halesowen, Mentone (France), Monmouth, Newcastle-on-Tyne, Oxford, Plymouth, Rochdale, Windsor, &c.

TESTIMONIAL.

The Gaslight and Coke Company,
9, Water Street, New Bridge Street,
Blackfriars, E.C., Feb. 27, 1875.

MESSRS. TANGYE BROTHERS AND HOLMAN.

Gentlemen,—The two 24-inch and three 36-inch Hunt's Equilibrium Governors supplied by you, and fixed in the valve-rooms at Whitechapel, Goswell Road, and Blackfriars, are working very satisfactorily.

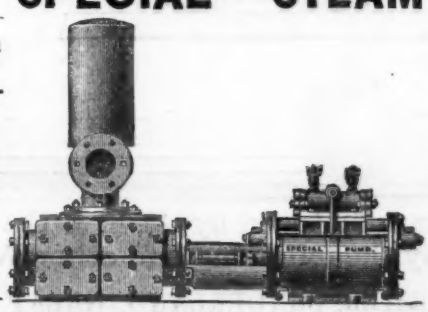
Yours truly,

(Signed) JOHN JOHNSON.

PRICES AND FULL PARTICULARS ON APPLICATION.

THE "SPECIAL" STEAM-PUMP.

Diameter of Steam Cylinder.	Diameter of Water Cylinder.	Length of Stroke.	Gallons of Water per Hour, Approximate.	Reduced Prices.
3	1½	9	450	£16
4	2	9	815	18
5*	2½	12	1,250*	20
5*	3	12	1,830*	22 10
4	4	12	3,250	25
6*	4	12	3,250*	30
5	5	12	5,070	32 10
7*	5	12	5,070*	40
6	6	12	7,330	40
8*	6	12	7,330*	50
7	7	12	9,750	50
10*	7	12	9,750*	65



In use in a Hundred Gas-Works in the United Kingdom for Pumping Ammoniacal Liquor, Water, or Tar.

Messrs. Burt, Boulton, and Haywood, Manufacturing Chemists, have over FORTY "Special" Steam-Pumps in use at their several large Tar-Works.

Two Hundred Sizes made. Those in Table opposite are the leading Sizes for use in Gas-Works and Chemical Works.

* These Sizes being usually selected for pumping Tar and Liquor, are always in stock, or nearly ready, fitted with all pump details in iron, and extra length distance-piece between steam and pump cylinder, at a small extra cost.

TANGYE'S HIGH-PRESSURE AND CONDENSING STEAM-ENGINES; CORNISH, VERTICAL, & TUBULAR BOILERS; HYDRAULIC AND SCREW LIFTING-JACKS, CRABS, PULLEY-BLOCKS, &c.

FULL PARTICULARS, ESTIMATES, CATALOGUES, ETC., ON APPLICATION.

London, 1851 New York, 1853. Paris, 1855. London, 1862.

Dublin, 1865. Paris, 1867.

The SIX MEDALS AWARDED to THOMAS GLOVER for

PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN,

LONDON, E.C.

THOMAS GLOVER & CO.'S PATENT DRY GAS-METERS

1st, Are a remedy for all the defects of Wet Meters;
2nd, Are suitable for all climates, whether hot or cold;
3rd, Incur no loss of Gas by evaporation;
4th, Cannot become fixed by frost, however severe;
5th, Are the most accurate and unvarying measurers of Gas;
6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
8th, Cannot be tampered with, without visibly damaging the outer case;
9th, Will last much longer than Wet Meters;
10th, Will not cost more than one-half for repair that Wet or Water Meters do;
Are upheld for five years without charge.

WILLIAM PARKINSON & CO.

(ESTABLISHED 1816)

ARE THE ONLY MAKERS

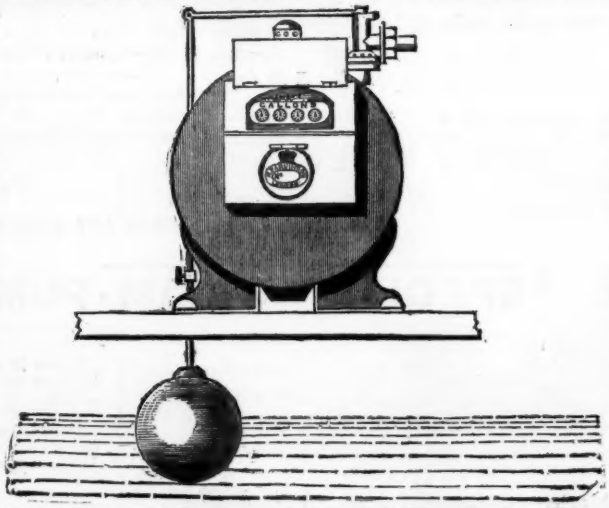
OF THE

LOW-PRESSURE WATER-METER.

These Meters will register with perfect accuracy, either at full speed, or with a few drops only passing through them.

They must be placed over the cistern to be supplied, and the water, after being measured, will fall from the outlet into the cistern below. Each Meter is fitted with a ball-valve, so made that it can be adjusted to shut off the supply at the inlet when the water reaches any required height in the cistern.

The 100-gallon Meter is fitted with a cistern holding about three or four gallons, and may be fixed inside a house, free from the effects of frost, and requires no attention after once being fixed.



From "The Engineer," April 6, 1877.

"Low-pressure Meters have been found to register with almost perfect accuracy, or, at all events, within 5 per cent. either for or against the consumer, and from the nature of their construction are by no means easily deranged. Still, even the low-pressure meters have their disadvantages, but these are chiefly as respects the question of first cost, seeing that they must have a cistern fixed at a higher level than that at which the supply is needed. All things considered, however, the balance of opinion rules at present in favour of the low-pressure Meter, and they are consequently increasing in favour as time goes on."

These Meters have been manufactured by W. P. & Co. for more than 25 years, and are largely used by the following and other Water Companies:—

NOTTINGHAM, DERBY, LEICESTER, SUNDERLAND, GREAT YARMOUTH, SHEFFIELD, NORWICH, LOWESTOFT, COVENTRY, SOUTHEND.

COTTAGE LANE, CITY ROAD, LONDON, E.C.

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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, NOVEMBER 27, 1877.

Circular to Gas Companies.

The Metropolitan Board of Works having burnt their fingers in an attempt to purchase the London Gas Undertakings, have turned their attention to another scheme, by the promotion of which the skin of the unfortunate ratepayer will be still more deeply singed. The merits of this scheme will doubtless be referred to in another column, and need not here be further noticed. Our object in now alluding to the matter is once more to call attention to the fact that the amalgamation of the London Gas Companies is still incomplete, and once more to point out that, without amalgamation, their existence and interests will always be in trouble. We have said existence, but that must always be in peril. It remains to be said, however, that the interests of the Companies can be better defended by one compact combination rather than by several having more or less disjoined interests. At the present moment nothing is heard of further amalgamations, but what is now recommended for the Water Companies will apply with equal force to the Gas Companies. It is absolutely essential that, for their common advantage, they should unite. It will probably be long before they are again assailed, for the Metropolitan Board of Works are a body who will disappear in the course of a few years. But preparations must be made for a struggle which is sure to come, and scattered forces are very liable to defeat. What the constitution of the next Parliament may be, it is difficult to say. The Liberal programme, as it is dimly discovered to us, shadows forth what may be called rather wide schemes of confiscation. With Mr. Alderman Chamberlain of Birmingham, as Chancellor of the Exchequer—and who knows but that may be his place in a Radical Cabinet?—Gas Companies will fare badly, unless they are fully prepared for an encounter which may be expected to follow the accession of the Liberal party to power. Disestablishment will be the order of the day, and Gas Companies may perhaps share the fate of other establishments. What is in the wind it is difficult to see, but we know that various influences antagonistic to the interests of the Metropolitan Companies are at work, and if in the course of the next few years London is endowed with a complete municipal organization, the position of the Gas Companies will be seriously threatened. We have at the present moment no fear of what may be called confiscation, but the future is dark, and fraught with dangers. The best way of combating them we see is by the very closest union for the protection of common interests, and for this reason we once more press upon our readers the necessity of a complete amalgamation of the Metropolitan Gas Companies.

We are happy to see that the science of gas making, and the best method of burning gas so as to produce the maximum of illuminating power, are attracting a good deal of attention. Two very interesting lectures on the subject have been delivered by Dr. Proctor, an eminent chemist at York; and Mr. Collinge, of Rochdale, has lectured on the same subject to an audience which, we are sorry to read, was only moderate. The more the public are taught respecting the nature of gas, its properties, and the best means of using it, the larger will be its consumption. So much ignorance prevails, even in the present day, on the points we have mentioned, that it is highly desirable that Gas Managers, and others in any way connected with the industry, should take every opportunity of enlightening the public mind. Lectures, such as we describe, delivered in provincial towns, have a doubly good effect. The information imparted, if attended to, is calculated to largely benefit consumers, while, at the same time, it tends to set them right with the makers of gas, whether Companies or Corporations.

A report in another column shows that Mr. Robert Jones has been interrogated by the Mile End Vestry respecting the recent conviction of the Commercial Gas Company for an excess of ammonia in their gas. Mr. Jones complains, and we think with reason, of the harsh conduct of the Metropolitan Board, who ought to have been satisfied with prosecuting the Company for one day's impurity only. The Company have, however, only themselves to blame for the issue. They must have received daily notice of the excess from the local examiner, and, under the circumstances, they were bound to appeal to the chief examiner. Having neglected to do so, they have to put up with the consequences. Mr. Jones's explanation of the continued excess is ingenious and plausible. He represents that, from unavoidable circumstances, a gush of ammonia escaped on one day, which it took several days to get rid of, and thus the case somewhat resembled that of the nigger servant accused by his master of getting drunk. "What! drunk again, Sambo?" "No, massa; same drunk—same drunk." So with the Commercial gas—same ammonia, same ammonia, for six consecutive days. Mr. Jones very properly explained that it is so much to the interest of Gas Companies to remove all ammonia in gas, it was hardly likely that any but the smallest quantity would be left in, except by accident. He has justified himself before his Vestry, and we hope that nothing more will be heard of the matter until it inevitably figures in the next accounts of the Company as legal expenses. The loss to the shareholders will be but small, and every one will concur with us in the recommendation that, if ever a like accident occurs, a prompt appeal should be made to the Chief Gas Examiner.

The hearing of the case of *Patterson v. The Gaslight and Coke Company* has commenced before the House of Lords. Mr. Patterson is conducting his case in person, and he opened it in an address lasting three days, after which the Lord Chancellor announced that the case would be adjourned *sine die*, and that notice would be given when it would be resumed, and whether or not it would be necessary to hear the respondents. Our report of the proceedings is not yet ready, but we will give it as soon as space allows.

We are continually advocating uniformity in the mode of publishing gas accounts. All our readers know that a form has been prepared by the Board of Trade, which is to be found in a schedule to the Gas-Works Clauses Act, 1871. We confess to a perfect approval of this form; but as the publication of all the details required by it is not always desirable or convenient, we may draw the attention of our readers to a somewhat simpler form prepared by Mr. Longworth, of Guildford, who states that he will be happy to forward a copy, gratis, to every Gas Company who may desire to see one.

What we have said above and before, as to the desirability of uniformity in the accounts, will, of course, apply to the Bolton Corporation, whose gas accounts will be found in another column. It will be seen that the undertaking is a rapidly increasing concern, although for the last two years evidently under a small cloud, in consequence of the diminished value of coke. The Bolton operatives, however, will be brought to their senses, trade will revive, and coke will be sold for its real worth. The undertaking is rather overloaded, and we regret to see so much profit applied in aid of rates. The reduction in the price of gas now announced will, of course, diminish the amount of disposable profits; the gas consumer will be benefited, and the ratepayers not in the least injured. In looking through these ac-

counts, which we cannot give so fully as they are published by the Corporation, we are struck by the smallness of the salaries paid to the leading gas officials. They have, if we do not mistake, a multiplicity of work to do, as the Corporation, besides making gas, do a fitting business, and also work up residuals. Their profits, it will be seen, are large, and they can surely afford those who make their profits better salaries.

The question of the value of a volumetric process for the determination of the amount of sulphur in gas is being debated in our columns. We confess to a strong prejudice in favour of the gravimetric method. The estimation of sulphuric acid in the form of barium sulphate is the simplest operation in quantitative analysis. Volumetric processes are easy and rapid in execution, but are all open to more or less objection, which we need not here detail. There is nothing like a balance for exactness; and, with a little care and some simple precautions, the estimation of sulphur by the precipitation method may be made with rigid accuracy. For this reason we advocate the continued use of the Referees apparatus and process in their entirety.

The electric light has found its way to Dublin, apparently under the fatherly conduct of Mr. Wigham. We know no one more competent to form an opinion as to its value than this gentleman. The workshops of Messrs. Edmundson and Co. were, no doubt, splendidly illuminated by the new light, as they might have been by concentric jets of gas. We are rather glad that this experiment has been made, for we expect to receive, in consequence, a more intelligent appreciation of the merits and demerits of the electric light than has yet been vouchsafed to the British public.

Water and Sanitary Notes.

An attempt was made last Friday, at the ordinary meeting of the Metropolitan Board of Works, to induce the Board to rescind the resolutions they arrived at a special meeting in the previous week. These, it should be remembered, were to promote two Bills in the next session of Parliament—one to effect a compulsory purchase of the existing Metropolitan water undertakings, the other to legalize an auxiliary supply, the nature of which we have sufficiently described. A thin attendance at the special meeting, and a very narrow majority, justified the attempt to obtain a reversal of the decision that was arrived at. Only thirty members out of forty-six were then present, but on Friday last forty-three mustered. The question simply affected the novel scheme proposed by Messrs. Bazalgette, Bramwell, and Easton, a scheme which they estimate will cost five and a half millions, but which would, in our opinion, if carried into execution, involve an expenditure of at least twice that sum. As to the desirability of purchasing the existing water undertakings, there seems to be perfect unanimity on the part of the Board. The fact is, they want something to do. The Board, which years ago did great things in the way of sewerage and embankments, have degenerated into a meddling and a money-lending concern. The *agenda* paper is often calculated to excite laughter. Mr. Smith, of some terrace, wishes to put a stucco portico to what he calls his villa, so application must be made to the Metropolitan Board, by whom it is granted in a way which would astonish all but *habitués* of the strangers gallery in Spring Gardens. Saint Mary, say, wants a loan of a few thousand pounds, to renew their paving, and the Board, having a large sum of money lying idle at the bank they patronize, generously consent to lend at three and three-quarters per cent., and so pocket a trifle on the transaction.

Looking through the daily papers, and listening to the discussion at the last meeting of the Metropolitan Board, we are struck with the fact, that so little consideration is given to the immense discomfort which would be occasioned to the inhabitants of the Metropolis, supposing—a very wild supposition—the new scheme should receive the sanction of Parliament. The streets of London would, for five or ten years, be in a continual state of disruption; every house would be invaded, and every household would be put to confusion; and, after all had been done, who can tell what benefit would be derived? It is not to be expected, that ordinary people would discriminate between the old supply and the new; they would take the first that came to hand; and, seeing the liberal service under the present system, we feel certain that not more than one in a thousand would resort to the new. It is likely, however, that if the water undertakings came into the hands of the Metropolitan Board, such restrictions would be placed on the supply, and such alterations would be insisted on in the fittings, that a servant would only have the choice as to which source she should go to in order to obtain a pailful of water in a quarter of an hour. Universal dissatisfaction would thus be caused, and every one would look back with regret to the days when, under the Companies, they could waste water as they pleased.

It was not without amusement that we heard some members declare, that the Board would forfeit their reputation if they rescinded the resolutions passed at the special meeting. We were not aware the Board had any reputation to lose, but if they have, it can hardly be increased by the discussions and proceedings at the two recent meetings. It was amusing also to hear the declaration that the members are not mere delegates. They are delegates, and it behoves them to do the behests of the Vestries and Boards they represent. When we have a popularly elected Metropolitan Council, some latitude of opinion will be allowed to the members, but at present it must be accepted that Vestrydom governs.

The progress which is being made in improving the water supply of South London is shown in the last half-yearly report of the Lambeth Water Company, which will be presented at their meeting to-day. The Company have a rather difficult district to supply, and it may tax the skill of their engineers to make that supply efficient all over the limits. This, however, seems to have been accomplished; and, perhaps, now the consumers will have less objection to pay their rates in advance. The Company may be congratulated on their financial prosperity.

Last Thursday evening the Gas and Water Committee of the Corporation of the City of London, without having given any notice to the New River Company, sallied forth, with the able Engineer of the Commissioners of Sewers and a staff of assistants, to test the hydrants that have been laid down in various parts of the City. They commenced in Basinghall Street, where they found that the pressure was sufficient to throw a jet of water to the roof of the Bankruptcy Court. They went on to the Royal Exchange, where, in spite of tempestuous gusts of wind, they found force sufficient to send a stream of water to the pediment of the building. They went on to Moor Lane, where an experiment proved equally favourable, and concluded their investigations in Upper Thames Street, where, as a matter of course, they found the pressure at its maximum. All this is extremely satisfactory, and settles the question of the value of hydrants, if they have any special value, so far as the New River supply to the City is concerned. But more must be said. The New River Company will presently be in a position to give an additional head of water, equal to a height of fifty feet; and if hydrants can prevent a general conflagration, another great fire in the City of London will be rendered impossible.

The present dispute about the Metropolitan Water Supply has induced Mr. Hassard once more to come forward with his scheme for bringing water, for the supply of the Metropolis, from the Cumberland and Westmoreland Lake district, and wherever else in the north and north-west the rainfall may be abundant. The objections to this scheme were so fully pointed out by the Royal Commissioners who sat in 1866 that they need hardly be again mentioned. The idea that London should be dependent for its supply of water upon one vast aqueduct, four hundred miles or so in length, with three or four pumping stations, liable to all sorts of accidents, which might deprive the inhabitants of this vast Metropolis of a supply of water at any moment, and for an indefinite period, is utterly absurd. We have a far better supply close at home, which is to be obtained without the least difficulty and at the smallest expense, and on that we intend to rely. On physiological grounds we deprecate entirely the sudden introduction of a soft water supply to the Metropolis. It would cause many evils which would puzzle medical men to cure. Apart from this, there can be no necessity for expending twenty millions of money to bring, from a distance of three or four hundred miles, a commodity which is to be found, of what we consider a better quality, close at hand. It is hardly necessary to discuss this question, for it is one which we are certain neither the Metropolitan Board of Works, nor any other authority that might be constituted, would seriously entertain. These visionary schemes, however, attract attention in some quarters, and it is well their absurdity should be pointed out.

One of the last societies in which we should have expected to hear objections raised to the scheme of the Metropolitan Board of Works is the Society of Arts; and yet we might remember that the Society also professes to represent Commerce as well as the Arts. The *doctrinaire* members, like Mr. Edwin Chadwick, C.B., and Dr. Farr, must, if present at the opening meeting last Wednesday, have listened with some astonishment to that part of the address of Mr. William Hawes which dealt with the proposals of the Metropolitan Board. The speaker may have had his own reasons for deprecating the confiscation of the Water Companies,

and advocating a continuation of the supply on pure commercial principles. We agree with the speaker on every point. It will be infinitely better to leave the supply in the hands of the Companies, or, as we hope will presently be the case, one Company, giving it the power to add to the sources and improve the distribution, than to load the Metropolis with an enormous debt in order to increase the patronage of the Metropolitan Board.

The Local Board of Henley have been recommended to take the water supply of the district entirely into their own hands. We are not yet told whether the present supply of the district is unsatisfactory, but we presume that allegations to that effect have been made.

Oldham has put in a strong claim to a portion of the Thirlmere water, and we do not see how it can be resisted. It is, we imagine, too late for the Corporation of the Borough to promote a Bill in the next session, but it would be easy for them to obtain a *locus standi* before the Select Committee which will investigate the scheme of the Manchester Corporation, and we are certain that their case will receive full consideration. Oldham has the powerful support of Mr. Bateman, who, we see, has not abandoned his idea of taking water from Ulleswater to Manchester. It seems as though the Corporation of this city may become the largest purveyors of water in the kingdom, and we are glad to see that neighbouring boroughs are narrowly watching their proceedings. Fifty millions of gallons from Thirlmere, and eighty millions from Ulleswater, added to the present supply delivered, gives a total far exceeding what is now supplied to the Metropolis.

The Corporations of Manchester and Salford are each considering schemes for the disposal of their sewage. The former calculate to expend £568,000 on the removal of sewage, of the ultimate destination of which we are not informed. The latter expect to spend £150,000 on a plan which includes precipitation, after which the delusive hope is entertained that their purified effluent may be fit to be used for manufacturing purposes. Such hopes have been indulged in elsewhere, but we never heard of a case in which they were realized.

Correspondence.

[*We do not hold ourselves responsible for the opinions expressed by Correspondents.*]

SYMES'S PROCESS FOR MANUFACTURING GAS.

SIR,—The principle of gratuitous assumption, by which, in your last issue, "W. M. G." claims to have "taken some trouble to review a sham," upon a mere hypothetical postulate of his own creation, may fairly be extended to the further assumption that "W. M. G.'s" *forte* lies much more in the direction of cavil than of comprehension.

Many of your readers must have been greatly puzzled how, in face of your lucid and illustrated explanation of the Symes process, "W. M. G.," while possessing the vast amount of chemical and mechanical knowledge implied by his letter, could possibly mistake the series of wheels placed in the hydraulic main, and actuated by the entering gas, for what he is pleased to designate as a "maze-like construction, with *chevaux de frise* bristling therein" to spike vapour!

If "W. M. G." be as earnestly disposed to learn as he seems eagerly inclined to *mis*construe others, the Pure Carbon Gas Company will be happy to afford him every facility for revising his erroneous assumptions, by a thorough practical demonstration at the Collinge Engineering Works, of the "Symes process."

FRED. W. SMITH, Secretary.

265, *Gresham House, Old Broad Street, London, E.C.*,
Nov. 23, 1877.

THE OSSETT LOCAL BOARD AND THE GAS COMPANY.

SIR,—I have read, with some surprise, the report of a meeting of the Ossett Local Board, which appeared in your JOURNAL last week. As the statements made at the meeting were strangely inconsistent with facts, it may interest your readers to have further information on the subject. The board charge the company with refusing to lay gas-mains to Low Lane, after being frequently requested to do so, unless the board would agree to contribute half the cost. The company never asked the board to contribute this sum towards the laying of the mains; and no deputation from the board ever waited on the company to carry out the lighting of the lane, as was stated at the meeting. The extraordinary resolution, therefore, proposed by a member—"That the board should cease to light the whole of the public lamps, and thereby throw the town into darkness"—caused as much surprise to the company as it did to the press and the public in this district. I may add that no negotiations whatever have taken place, between the board and the company, during the past year in respect to the lighting of Low Lane.

Ossett Gas Company, Nov. 24, 1877. RICHARD FRANCE HAIGH.

FARNWORTH AND KEARSLEY GAS COMPANY.—The directors are intending, in the next session of Parliament, to apply for further borrowing powers, and for powers to construct additional gas-works at Kearsley. The works of the company at Farnworth are now very extensive, and the quality of the gas manufactured there is being rapidly improved; and with other works at Kearsley, in which township it was once thought to erect the works which are now located at Farnworth, there can be no doubt but that the entire district will, for years to come, have more than the required quantity of gas, and of the best quality too. By their present application for powers the company are putting in the remote distance a recurrence of the state of things of last winter.—*Farnworth Journal.*

Legal Intelligence.

HIGH COURT OF JUSTICE—CHANCERY DIVISION.

(*Before Justice* FRY.)

THURSDAY, NOV. 15.

THE ATTORNEY-GENERAL *v.* THE GASLIGHT AND COKE COMPANY.

(*Continued from page* 797.)

Mr. *Thomas Nesham Kirkham*, examined by Mr. SMITH.

I am a civil engineer, and was formerly chief engineer of the Imperial Gas Company prior to their absorption into the defendant company. My connection with the defendant company ceased in March, 1876. I know perfectly well the construction of the defendant company's premises and apparatus at Bromley. I know the manner in which the gas has been and is now manufactured there. I have been there lately, and constantly. After the gas is exhausted from the retorts, the first purification is in the condensers. The gas having passed through the condensers is subjected to the washers and scrubbers. The gas is exposed to the action of water, and the ammoniacal liquor and tar are taken from it. Then it is passed on to the scrubbers, which is part of the same process. It then passes through purifiers containing sawdust saturated with sulphuric acid; then it goes through lime. I know the requirement that there should not be more than 20 grains of sulphur impurity in every 100 cubic feet of gas. That limit cannot be practically attained without the lime process, so far as I know. The process at Bromley is the same as is used at other establishments. It is necessary from time to time, when the lime has performed its office, that the purifiers should be emptied. I know the manner in which that is done at Bromley. It commences about six o'clock in the morning. As regards the emptying, it cannot be done, except in daylight, without danger. When the purifiers are emptied before raising the lid, air is partially drawn through them, to get rid of any sulphuretted hydrogen or any bad smelling gas that may be there. Then the air is passed through oxide of iron to rid it of the sulphuretted hydrogen, to cause the sulphuretted hydrogen to be fixed in the oxide of iron. They then raise the lid of the purifier. That applies to the lime purifiers in succession. It is then principally carbonate of lime. It is sometimes very dry, and at others very wet. It is sometimes so hard that they are obliged to take a pick to remove it off the shelves. You never know in what state it may come out. Then the lime is removed tray by tray, air being driven through at the time the men are taking it out. There is a body of oxide of iron in a tank for the purpose. The lime is put into waggons covered with breeze or some other material. It is first put into bags or baskets and covered with breeze. The breeze is sometimes dry and sometimes damp. We should not use damp breeze when the lime was wet, but when the lime was dry. I do not know that the breeze is used on every occasion. If there is not sufficient breeze they are obliged to take the lime away, whether it is dry or not. Having got the lime from the trays, it is put into waggons, which are within 3 or 4 feet of the purifiers. I am not sure whether within a foot. The waggons run on tramways; they are tip waggons. The lime is covered with breeze or earth. Then the waggons are run some distance from the purifiers on to the company's premises to fill up the land that lies low. They are run to a tip, at the present time 80 or 90 yards from the purifiers. Then the waggons are tipped, and the lime is covered over with breeze again. That is the process which has been used up to within the last few weeks. A change has taken place within that time, but not as regards the covering with breeze, nor in the manner in which the lime is taken from the purifiers. It is first put into bags or baskets, then into a tip waggon, and then into a hole. The change is that, at the present time, instead of passing air through the purifiers, they are passing clean gas for the purpose of ventilating the lime, and taking the sulphuretted hydrogen from it. The gas is in the place of the pure air which was formerly passed through, and was then exposed to oxide of iron. I first heard of that being done some years back by the City of London Gas Company with better results then than with air, as it has turned out now.

By the COURT: The late trial has proved it to be better than using air.

Examination continued: I have not myself seen how gas being passed through the purifiers for ventilation acts. The mode I have described was the ordinary mode of cleansing the purifiers used in the establishment; but I do not know that it is done everywhere, neither is it what was used in the early part of 1876. At that time the air was passed through a furnace after leaving the purifiers. That was abandoned because the result was dangerous. Two or three explosions took place.

By the COURT: There is no danger in passing the air through oxide of iron.

Examination continued: When the purifiers are open there is a smell. What disseminates the smell is not the dust. I do not think that could ever reach 2½ miles. The smell is merely the gases given off mixed with the air.

By the COURT: I do not think the smell is caused at any distance by the carrying of dust.

Examination continued: The smell is worse on a close foggy day near the works, because it would not be carried away, it would hang about.

Cross-examined by Mr. KAY: I am not now the general engineer of the company. I was so up to March, 1876. I am not now in the company's service. In the year 1876 I went to the Bromley works at least four times a week, sometimes early in the morning, and sometimes later. I did not visit the other works so often. The object of my visits was with reference to the large extensions going on there, and the general works. I believe there is a man at the Bromley works whose special duty it is to overlook the operation of emptying the purifiers; but the resident engineer will tell you. When I was in power there was such a man. The resident engineer in 1876 was Mr. Wright, and he is there still. He was there in the year 1875 as resident engineer. I know Mr. Hooper. He does not reside on the works. He is there every day. Mr. Wright is there day and night. Mr. Hooper's special duty in 1875 and 1876 was to draw plans of machinery, and so on. The only really responsible man there was Mr. Wright. He was not responsible for the mode of purification—he was responsible for the operation. He was responsible for the mode in which it was done day by day. I do know the man's name who was appointed to see that every precaution was taken to prevent nuisance. Sometimes I was there all day, and sometimes only two or three hours. I stopped there to investigate matters, including the manufacture of gas. I went for the purpose of watching the manufacture sometimes. It was not part of my duty to see that in emptying the purifiers it was so done as not to cause a nuisance. It was no part of my duty to stand there. I have frequently been there as early as seven o'clock in the morning. I was called up on one or two occasions in the middle of the night when an accident occurred. I was not ordinarily on the premises during the night. The rule was that the men should commence opening the purifiers at six o'clock in the morning. The danger is in having lights about the purifiers in case of any escape of gas. Before the purifiers are opened the gas is shut off. The shutting off is sometimes imperfect. We cannot always prevent pieces of lime getting into such a position that you cannot close the valve. There is a mixture of gas which exudes from the lime itself when exposed to air; but the principal compound is sulphuretted hydrogen.

By the COURT: The men do not generally begin at six in the winter; they may begin earlier than that in summer.

Cross-examination continued: We have night gangs and day gangs, but not for the purifiers. Either in the winter of 1874 or the spring of 1875 air was first drawn through the purifiers; that was common outside air; it was drawn through by an exhauster. I cannot say the exact motive power employed, although I have seen the air drawn through hundreds of times. The motion was obtained from a portable engine, I believe. That engine is in existence still, but whether it is doing that particular kind of work I cannot say. I cannot say when that engine was first used. The ventilation has sometimes gone on for six or eight hours, and sometimes longer. I have seen the thing started, and gone back again and seen it at work. The average time during which air is drawn through before the purifiers are opened has, on many occasions, been more than two or three hours; I do not think ever less than that time. I have been at the works when a purifier has been open without air being drawn through, but not often—not a score of times; it may be ten. Sometimes it was because we had not time to get the purifier emptied and recharged. I was not present, except twice, when explosions took place. I cannot say how many explosions there have been; but one I saw was some time in 1875, when we were trying experiments. It was not so on each occasion. It was not caused by drawing heated air, or heated gas, or carbonic acid through the purifiers. A certain amount of air was mixed with the gas, and this caused it to explode afterwards. I cannot say how many times I have watched the process of emptying the purifiers at Bromley in 1875 and 1876. Sometimes the purifiers would be opened twice a week, and sometimes oftener. I should say I saw it in 1875 at least 30 or 40 times. I cannot say that, on all occasions, air was drawn through and passed through oxide of iron before being burnt; but the greater part. I know on certain occasions that was omitted, because we had not time to empty the purifier. It could have been avoided by having more purifiers. We should not then be hard up for time to open them. The difficulty might have been obviated to an extent by having more purifiers, but not absolutely, because you must have a certain amount of gases given off. We were putting up other purifiers at the time I am speaking of.

By the COURT: If we had had enough purifiers we could have got the requisite time.

Cross-examination continued: I do not know the number of purifiers they have now, but I believe eight. There is plenty of room for eight more, and they are putting up more now. The cost is a heavy item. I have been present when purifiers have been actually opened, and the lime taken out. The waggon is really under cover. It goes through the shed which holds the purifying material. It runs through the middle of this shed. The waggons are loaded close up to the purifiers. The two sides of that shed have openings. The side of the shed nearest the purifiers is open. I will not say positively that the waggons are under the shed when they are filled, because the waggons may either go in lengthways or sideways, and if they go in lengthways part of the waggon would be under the shed.

By the COURT: There is a turn-table opposite each lime purifier, and the back of the waggon is shunted against the purifier. The operation of taking out the lime from the purifiers and putting it into the waggon is performed in the open air.

Cross-examination continued: I believe the waggon is put up close to the purifier; it may be within a foot or a foot and a half of it. The lime is taken in bags, and sometimes in baskets. The bags and baskets are tipped out into the waggon.

By the COURT: The top is taken off the trays first, and then a man goes into the purifier. The man is on the edge of the purifier, and tips the lime over into the waggon.

Cross-examination continued: I do not know that it is shovelled from the purifier into wheelbarrows. I do not recollect that it was done as Mr. Vernon Harcourt stated; but there would be no extra precaution taken because he was coming. The waggons are open-top waggons. The men push them away, and the stuff is tipped within the grounds of the company, and usually covered with breeze. The waggon is covered with breeze again. Sometimes there is not sufficient breeze to do it. I cannot say how often that happens. It was not my duty to see there was sufficient breeze on the premises to cover the lime so as to prevent a nuisance. I do not know that it was anybody's duty.

By the COURT: I do not know that it was nobody's duty to see that these precautions were taken, because men were employed for that purpose.

Cross-examination continued: I cannot say whose duty it was to see there was sufficient breeze to cover the lime, and I cannot say how often that was neglected. I have not seen, since the first fortnight or three weeks after we commenced operations, that the waggons were not protected by breeze. When the breeze was not sufficient, the men would use the soil from the yard. I have seen other materials used to put over the tops of the waggons. The company allow people to shoot cinders, ashes, and soil there, and they use them. Sometimes they would use the lime that has been lying about there for some time. That has been done, but I cannot say how often. If they have not breeze they use other material, and if they have not other material they use the lime. The line of railway comes past the centre of the last blocks of buildings, and the land between the stream and the dock is being covered. I should think the deposit might be 9 or 10 feet.

By the COURT: The deposit may occupy a couple or more acres.

Cross-examination continued: The land on the north side is not entirely filled up; but I do not think they are tipping the lime there now. Some of the lime tipped there formerly came from the Fulham works. We had it brought by hatched barges. I cannot say what precautions were taken with regard to it. That would be done in 1875 and 1876. I cannot say the quantity of lime brought there and tipped on the works. I cannot form an idea. I do not know whether any of the foul lime produced at Bromley was sent away. I have not been there constantly since March, 1876.

Re-examined by Mr. DAVEY: The foul lime deposited on the land does not emit smell or odour to any extent after it is deposited. It could not be smelt 50 yards off. Directly it is tipped it is covered up. If you walked over it an hour or two afterwards you might smell it. There is always a certain amount of stink produced from gas-works. I believe the refuse stuff—cinders, and so on—quite as efficient as breeze. One or other material is always employed. The depth of a purifier is 7 feet. You can only throw out the lime for about 3 feet, and then the men are obliged to carry it. The purifiers are 40 feet long and 20 feet wide. The purifying material shed is open at both ends for the tramway to run through it. Mufflers, made of crape, are worn by the men, to keep the dust out of their eyes.

By the COURT: In small works the purifiers are under cover.

Re-examination continued: The purifiers contain 25 cubic yards of lime. I do not know of any place where the purifier-house is closed altogether; it is always open at the sides. The sides of the purifying material shed are closed, and what is open is merely the two ends.

By the COURT: In the purifying material shed there are several openings.

Re-examination continued: That is for the purpose of getting at the purifiers. I could not suggest anything which would render the purifying-houses more efficient. I do not think they could be closed in, with safety to the men employed. You might put a roof of some height at the top, otherwise the men could not stand working in the purifiers, on account of the dust and gases that are given off. Since March, 1876, I have not been constantly on the works. The explosions were when we were trying experiments to get rid of the nuisance as far as possible. So far as I know, the company never abstained from adopting any process which seemed likely to yield good results. The company have never, on the ground of expense, exhibited unwillingness to give any experiment a fair trial.

By the COURT: They are trying some experiments now which appear to be successful. When I said gas was purified, I meant it was purified from sulphuretted hydrogen. One difficulty in using air is that you cannot, in a given time, get sufficient air through properly to purify. If we had worked the Bromley station regardless of expense, we might have done many things. When I say the thing is impracticable, I mean with such an outlay of money as I would advise the company to make. If an injunction were granted against the company to prevent them committing a nuisance, it could be abated if there was no limit to the expense.

Mr. *William Gordon Wright*, examined by Mr. DAVEY.

I am the chief engineer of the defendant company's Bromley works, and have been so since 1874. I had 15 years experience before that at Fulham. I am living on the works, my house being about 150 yards from the nearest purifier. I am there day and night, except when I am away for a holiday, and I have not many holidays. The company have 156 acres of land, and about 100 acres of these are in their occupation. We are making between 5 and 6 million cubic feet of gas per day there now, and use 100 tons of coal for every million cubic feet. We have about 750 men employed at the works. I should prefer to have the purifying-houses open. If they were closed completely there would be great danger to the men from the gases given off. I have seen a good many works, and the purifying-houses generally have a draught of air through them. There are different classes of men employed by us. Some one has the duty of superintending the discharge of the purifiers. His duty is to carry out my instructions, and he reports to me daily. If my instructions were not carried out, it would be his own neglect. I remember Mr. Vernon Harcourt's visit to our works. On that occasion the lime was covered with breeze nearly 2 inches thick, and then dug out into wheelbarrows and passed into trucks. The wheelbarrows were inside the purifiers. Bags, baskets, and barrows are used for that purpose. We use barrows for the upper beds. On the occasion of Mr. Vernon Harcourt's visit we were not tipping the lime out of the barrows on to the soil. The lime is immediately covered with breeze or rubbish that is brought in. I have been on the ground when the lime has been tipped. I have been accustomed to gas lime for 23 years. We used oxide until Dr. Letheby found out the sulphur compounds, and then we used lime. I do not at my own house observe the smell to any extent after the lime has been covered. I cannot call to mind any occasion when we have not used breeze or some material of that kind until the last two or three weeks. One material is quite as good as the other. In making a side shoot on to the tip the old refuse lime has been used, but the lime that is raked out of the last purifier is never used to cover the preceding. I find the old lime, when used, is sufficient for the purpose. The lime so used has been deprived of its noxious qualities. That is only occasionally done; oftener than once in six times. That is taken from the surface, and underneath it is principally carbonate of lime.

By the COURT: I have not known that the new surface, after taking off the top, has given off a smell. I am so accustomed to the smell that I do not notice it.

Examination continued: I have been present at the operation. I have tried many experiments at these works for ventilating the lime. They have sometimes involved considerable expense. One or two explosions took place, in one of which an oxide purifier was destroyed, and there was one in the furnace. That was a cause of danger to the works. I have tried ventilation by air without the furnace. I have never been checked by the directors in trying experiments on the ground of expense, but rather the other way. There is no disposition on the part of the directors not to avail themselves of any practicable means, on the ground of expense. I think we had three explosions, and the oxide purifier was damaged in each case. Until the oxide purifier was repaired there were no means by which the lime could be ventilated.

By the COURT: With that exception, until lately we have always used ventilation.

Examination continued: If the purifiers were not ventilated it would be a breach of duty. During the last three weeks we have not been ventilating with air, because there is great difficulty about it, and we are trying clean gas now with carbonic acid still in the gas. We pass that through the sulphide of calcium purifier, and the carbonic acid drives out the sulphuretted hydrogen, and the other sulphur compounds with it. When I first tried it I was not aware that it had been tried at other works.

Cross-examined by Mr. KAY: I heard the question put by the Court to Mr. Kirkham before he left the box. I do not consider that any expense would render the lime perfectly innocuous. I do not see how the nuisance can be mitigated. The lime heats in the purifiers when we ventilate them. The time it takes to heat it depends on the condition of the purifier, and the speed with which the air is drawn through. If drawn through with sufficient slowness, we could prevent the heating. I could draw a foot an hour, no doubt; but I think it would heat then. I say that deliberately. The velocity with which the air is drawn through, has to do with the degree of heat. I have made experiments, and in all cases I found the lime was heated. I was able to carry on experiments through 1875 and 1876; it always heated the lime. The injury done was that the nuisance was greater. The foul lime evolved more gas. Oxide of iron will never touch some of the sulphur compounds. When the air is passed into the oxide purifier, it takes out the sulphuretted hydrogen only. If the air were allowed to cool, and were passed through more oxide purifiers, that would not diminish the nuisance. The vapours can only escape after they have passed the oxide purifiers. If we had a greater number of oxide purifiers, and took care that, before the lime had been drawn through the last one, it was drawn out into the open air, and sent through the oxide purifier, it would be purer. I have passed it through five, and that made it better than passing it through only one. If we had 15 it would make it better still. There is some decomposition that takes place in the lime, which the oxide of iron will not take up. That is the case whether the air is cool or hot. After the air has passed through the oxide purifier, it is sent into the open air. I have passed it through water, and also through a furnace; but that was dangerous. There is great danger at all times. I know that the slower the air is passed into the furnace, the safer the operation is. I cannot conceived a purifier being so arranged that the sides could be open, and the trays slid out.

By the COURT: The trays are wood sieves that are taken off.

Cross-examination continued: There would be a difficulty in arranging

a purifier so that the trays could slide out. I do not know that in some works the lime is passed into closed vessels, without exposure to the air. If we doubled the number of purifiers, and used one set one month, and then very slowly and deliberately emptied the other, with every precaution, we could no doubt avoid a great deal of the nuisance which exists now; but the whole place would be smothered in purifiers. It would be a question of expense. The foul lime spread on the ground, if it lies a certain time, loses all its gases—they will go into the atmosphere. I do not think that is the cause of the nuisance complained of. I cannot say at what rate it exudes into the air. It depends very much on the condition of the lime. There must always be some emanations from the heap that is around the works. If the lime were taken away there would be an end of that matter. It would have been much better if no lime had been brought from other works. It would have been costly to have sent it away to other places.

By the COURT: I do not know how many thousands of tons of refuse lime there are there. I should say two-thirds of the lime was brought from other places up to September, 1876. The whole of the lime from the St. Pancras, Fulham, and Shoreditch works was brought there between some time in 1875 to about September, 1876. I was present when Mr. Vernon Harcourt came to the works. I heard him give his evidence. He said the covering with breeze was of no avail, but I consider it is a great benefit. It is usually put on about two inches thick. It is covered all over the surface of the purifiers. When the shovel is put in it is disturbed; then the trucks are covered up with it, and the lime on the tip also. When a man fills a basket or a bag he does not put breeze on it. You cannot cover each shovelful. We never tried putting it into closed waggons. I have never carried any away from the works in closed barges, or in any barges. I do not know how much of the nuisance could be obviated by trying that. I think it is as effectual to remove the lime as we do. It would have to be exposed while it was being shot into the barges. I believe the nuisance is caused as the lime leaves the purifiers. I think Mr. Vernon Harcourt was right in saying that the purifiers were not being ventilated when he was there, but that was because the exhauster was under repair. We have an operation of grinding lime in a mill. No precaution is taken, because no smell comes from it. It is carbonate of lime that has been deposited on the land a considerable time. There is no sulphuretted hydrogen in the sample now produced, and shown to me. I cannot say where it comes from. I smell nothing offensive in it. I am well accustomed to the smell, no doubt. I did not give evidence before the Parliamentary Committee. It is true I saw Mr. Angel, and asked if he felt disposed to assist us by giving evidence to the fact that there was a nuisance proceeding from the works. No evidence was brought to disprove the cause of nuisance, that I recollect. I do not know that the reason why the committee threw out the Bill was because they were not satisfied we had done everything in our power to mitigate the nuisance.

Re-examined by Mr. DAVEY: Except when the oxide purifiers were under repair, the air ventilation was always used, so far as I know. The oxide purifier was under repair when Mr. Vernon Harcourt was there. When spent lime is put on the ground the sulphuretted hydrogen is oxidized and forms carbonic acid, I should say, and then it forms sulphate of lime. It is not, therefore, correct to say that the sulphuretted hydrogen goes off into the air, except as to a certain portion. Some portion of the sulphuretted hydrogen would go into the air. The greatest smell is when the men are digging out the lime. In the later portions of the operations, when spread on the ground, there is nothing approaching to the same smell. If there be a nuisance, it is when the men are digging it out. I cannot conceive it possible to draw the trays out of the purifiers. It is necessary that the sides of the purifiers should be hermetically closed. The top is sealed. There are about 25 layers of lime in a purifier. The weight would be about 30 tons. The weight of a tray would be 7 or 8 tons. I have never known such an operation as drawing out the trays suggested, and I think it would not be a practicable operation. When the air is drawn through the purifiers it is charged with sulphuretted hydrogen and other sulphur compounds that I do not know. Oxide of iron will take up sulphuretted hydrogen, but it has no effect upon the other sulphur compounds. Therefore, if we passed the gas, whether heated or not, through 15 purifiers, it would not assist us in the least in getting rid of those other sulphur compounds. From 1875 until three or four weeks ago we always treated the lime with air ventilation, and we have now ceased to do that, because we have been trying other experiments.

By the COURT: From some time in 1875 to about September, 1876, the lime was brought from Fulham, St. Pancras, and Shoreditch works, to the land in closed barges. They discharged at the end of the dock. The lime was dug out and put into trucks. No precautions were used except covering it up at the top. It was left open in the waggons. There was a smell emitted from the digging out of the barges. That was done once or twice a week, at no particular hours of the day.

FRIDAY, NOV. 16.

Dr. *William Odling*, examined by Mr. SMITH.

From my knowledge of the manufacture of gas, it is not possible to make it of the required purity without the use of lime. I am aware of the precautions which have been adopted at the defendant company's works to prevent a nuisance. The foul lime is taken away in waggons, and deposited upon the ground. No smell would be emitted from it when it was buried—that is when covered entirely with earth. It then ceases to smell. I heard the evidence given yesterday, as to covering the lime with breeze. I do not think such a covering is a matter of very great importance one way or the other. I have no doubt covering the material with breeze removes one-tenth only of the nuisance, which is caused principally by emptying the purifiers. You have, perhaps, 50 or 60 tons of very foul stinking material, and this has to be emptied out of a tank into carts, and, during the time it is exposed to the air, gives off an objectionable smell, which is a substantial annoyance. When tipped out of the cart, there would be another annoyance. The nuisance would be substantially the same, whether the lime was tipped from the cart on to a tip or into a barge. Sometimes, when tipped into a barge, it is sent through a covered shoot, but it is not when sent on to a tip. In 1874 and 1875 considerable quantities of lime came from the other works, and were deposited on the land at the Bromley works. The importation of that lime to the *locus in quo* would be liable to cause a slight nuisance; but, after it was once emptied, there would be no further nuisance.

By the COURT: The emptying from the barges on to the land would repeat the nuisance.

Examination continued: The lime which would come in the barges would not be to any great extent diluted with fresh air.

Justice FRY: I have been told in evidence that, during the period from 1875 to September, 1876, about two-thirds of the lime deposited upon the land was imported from other works. What proportion of the nuisance do you attribute to the imported lime?

Witness: About half the nuisance on the works; I do not say to the neighbourhood.

Examination continued: The main portion of the nuisance would come from the emptying of the purifiers. I think that the amount of nuisance from the material during the time it is in the cart, being conveyed from the purifiers to the place where it was to be shot, would be quite insignificant. I differ from Mr. Vernon Harcourt in thinking that the amount of dust thrown off the lime by removal causes much annoyance. If it did fly off to any extent, vegetation in the neighbourhood would be injured. It would soon become sulphate of calcium.

Justice FRY said the dust would not be worse than any other dust.

Cross-examined by Mr. ASTON: That would apply if the dust were charged with atoms of bisulphide of carbon. If you could sufficiently aërate the material in the purifiers you could empty them without creating any nuisance. I was called to give evidence before the Committee of the House of Commons in support of the Bill of the Crystal Palace Gas Company, but I was not on behalf of the defendant company. On that occasion I said it was not absolutely impossible to supply the gas with less than 20 grains of sulphur in 100 feet, but that it was entirely a question, to use a common expression, of whether it was worth while. I am still of the same opinion. I heard the evidence given yesterday by Mr. Kirkham that it was quite a matter of expense, but I think that is a different matter altogether. I told the committee on the Crystal Palace Gas Bill that the company were not called upon to do anything which they could not absolutely do; they were called upon to do a thing which involved very serious consequences. I have seen the process of aërating the purifiers put into operation at the defendant company's works, and I am familiar with the operations as carried on at Bow. To the best of my knowledge, the works at Bow have not been complained of by the neighbourhood, but the amount of smell does not differ from that emitted from other works. It depends entirely upon the character of the neighbourhood whether the operation is complained of beyond the works. Bisulphide of carbon, if distributed, would produce the same effect at Bow as at Bromley. I do not know that there are processes of aëration carried on at Bow. If the process of ventilation was properly carried on, the contents of the purifiers could be properly aërated, but I do not know of it myself as a practical operation. I was informed by Mr. Wright that the process of aëration had been going on for eighteen hours in one purifier, but I believe it did more harm than good. I did not test the speed at which the currents of air were passed through the purifiers. No doubt the speed at which the air was passed through would affect the operation. If you made a current go exceedingly slow, and went on with it indefinitely, the material would be deodorized; and, following that out, if the company had a series of purifiers, and put them aside after being used, and took new ones—never using the old ones again—all nuisance could be avoided. Of course, that is simply impossible. You must disregard expense and trouble, but you must not put restrictions on a company which make it impossible for them to carry on their business.

Justice FRY: If you disregard expense and trouble, you disregard the ordinary element of successful manufacture?

Witness: The company must not be deterred from anything by any reasonable amount of expense and trouble; but it is unreasonable to ask them to do what is almost impossible.

Cross-examination continued: If I myself made a series of experiments, passing the air through from the rate of one foot to 16,000 feet an hour, of course I should be able to give an opinion upon the matter. I am not prepared to say that the process of aëration would be successful if it were conducted with slow currents. In the present state of knowledge, there are no means known by which the difficulty can be overcome. Supposing one purifier were thrown out of work, and the material allowed to cool before being emptied, the material would be brought to the same state as it was before the air was passed through it. I have been told by Mr. Wright that he carried on the process for a week, and the layers were then quite as hot and as stinking as before. The process was carried on for that time in the same purifier. It was a very difficult process to aërate this material.

By the COURT: If attention were directed to it for some time, no doubt an efficient process might be discovered.

Cross-examination continued: Supposing, instead of having one spare purifier, you had two, the increased facilities for aëration would render the success of the operation more possible. In so far as the increase of purifiers would give an increase of time to deal with the question of aëration, it would be an advantage.

By the COURT: If you kept up the system of ventilation in the purifiers, and put half as many trays in, the result would be better. At present there are four or five trays in each purifier; if you only had one tray, and increased the number of purifiers, it would be more manageable. I think that would be putting the company to an unreasonable amount of expense.

Cross-examination continued: The relation between the volume of gas passed through a purifier before it becomes foul, and the volume of air which would be required to oxidize the bisulphide of calcium, to render it chemically innocuous, would be about 1-20th. At the present time, the gas which is drawn through the purifiers does not pass through oxide of iron. There would not be any risk of the gas exploding at the surface by passing it through a furnace, providing everything was in proper condition. There are many risks to be incurred, and where you have a large volume of gas in the connecting purifier under considerable pressure, there is always the risk of leakage, which makes it an unsafe operation.

By the COURT: If the use of the furnace were carried on at a considerable distance from the purifiers an explosion might still take place.

Cross-examination continued: If the gas were passed through water between the last purifier and the furnace, an explosion might take place, but it would be confined to a limited space.

By the COURT: The purification by oxide of iron, so far as it goes, is quite sufficient at the present time, and no addition of oxide would add to the efficiency of the operation as now carried on. The furnace would be used to stop what the oxide would not. If the oxide purifiers and the furnace were used more repeatedly, the foulness of the gas would be diminished. Everything that oxide can do is now done; there is no need for any extension of that, because it would not improve matters. The oxide at present used is largely in excess of what is required. You might increase the quantity of air passing through a given quantity of lime, and you might, by a sufficiently free use of oxide, purify the air.

Cross-examination continued: That operation has not been carried out. I believe Mr. Evans, who is a great authority on this subject, said it had been done once. If the currents of air, when charged with sulphur compounds, after going through the oxide of iron, were conveyed into a high shaft, there would be no danger. The shaft would be in lieu of the furnace. The disturbance of the charged refuse is the substantial cause of nuisance. The refuse is considerably disturbed by being dug out of the purifiers, and also when being conveyed to the tip. I do not think the evil effects of the disturbed refuse would be avoided by its being conveyed through a closed shoot into a closed receptacle. If you can get 60 or 80 tons of stinking material out of a tank into a cart without exposing it to the air, there would be no nuisance. I have heard that at some gas-works the use of closed shoots and covered barges is very general. Where a shoot is required it should be a covered one, and the same with regard to barges. I know covered shoots are used at the Fulham works, but I also know that those works are the subject of complaint.

Re-examined by Mr. SMITH: I do not know whether the covered shoots

at Fulham are between the purifiers and the vehicles in which the lime is is conveyed away. I think it is taken directly from the purifiers into closed iron waggons, and from thence discharged into the shoot. In my opinion, the oxide of iron purifier is amply sufficient for the purpose of arresting the sulphuretted hydrogen. There are certain gases which the oxide of iron does not collect. In my opinion, those gases cause a great part of the nuisance complained of. In practice, I believe if the gases which escape from the oxide of iron were passed through a furnace, it would expose the workmen to great risk of danger. As a matter of practice, furnaces are not commonly used in large works.

By the COURT: A shaft carried to a great height would be of some little use.

Re-examination continued: The effect of the shaft would be to disseminate the noxious gases to a great distance.

By the COURT: My impression is, a shaft would be useful for diminishing the nuisance.

Re-examination continued: As a matter of practice, I do not know whether shafts have been used for carrying off the gases which escape from these oxide purifiers, because the introduction of them is quite a recent thing. If the experiment of using a shaft were tried, it might probably be successful; but then would arise the question, if the gases were of sufficient intensity, that the effect would be to annoy a neighbourhood farther off. Nine-tenths of the nuisance is due to the air passing through the oxide of iron, the remaining one-tenth would not be a nuisance to the neighbourhood. No doubt the material is very nasty when you are near to it, but that it should affect a large neighbourhood is to me quite inconceivable. I do not agree that the abatement of the nuisance is a mere matter of expense. I think it is the want of knowledge.

By the COURT: I did not hear Mr. Vernon Harcourt give his evidence. I have only been at the Bromley works once since the use of the lime process has been in question. I went over them in 1874, when they were at work. I have been over them twice, but only once in view of this enquiry. I have no knowledge of the process which was in use between May, 1874, and May, 1876. I was there in January, 1874. When I was there, three months ago, I saw the processes in use for preventing a nuisance, but I had very great doubt whether the ventilation, as then carried out, was of any use at all. I may say, however, that it was carried out in a perfectly *bonâ fide* manner. I do not think I could show them a better way of working. I do not know whether the ventilation at Fulham is more perfect than at Bromley.

Justice FRY said the question to be tried was, whether the works had been carried on in the best possible manner.

Mr. SMITH: As reasonably as practicable.

Justice FRY said he wished to direct attention to the fact that the evidence went to show that from 1875 to 1876 two-thirds of the lime deposited on the land at Bromley came from other works, and Dr. Odling's evidence proved that half the nuisance was due to that imported lime. Was it possible, in the face of that evidence, to show that no more nuisance had been created than was absolutely necessary.

Mr. SMITH said, as he understood the evidence of Dr. Odling, it was the half of one-tenth.

Justice FRY replied that applied only to the home nuisance. Nine-tenths was from digging the lime out of the purifiers, and one-tenth was from the gases which remained in the air after passing the oxide of iron. But to make the matter clear, he would ask the witness whether he was right in the interpretation he had put on his evidence.

Witness: Yes, my lord.

Justice FRY said he did not wish to stop the case, but the defendants had to consider the effect of the evidence just given.

Mr. SMITH said the company understood they had to meet a case of not having carried on the works in a proper manner.

Justice FRY said he only wished to direct attention to the pressure of that point upon his mind.

Mr. SMITH admitted he could not displace the evidence given. He could not carry the case further than he had already done. The importation of lime from other works had long since ceased. Would the injunction be to restrain the company from manufacturing gas hereafter in any particular way?

Mr. KAY: So as to commit a nuisance.

Justice FRY said the injunction asked was to restrain the company from carrying on business in such a manner as to cause a nuisance.

Mr. SMITH said if his lordship was of opinion that the evidence proved a nuisance during the period complained of, the injunction must go. He could not help it. Knowing what his case was, he felt that he could not displace the evidence which had already been given.

Justice FRY said the defendants were quite at liberty to call further evidence if they thought it material.

Mr. SMITH replied that, after the expression of his lordship's opinion upon the evidence given, he did not think he could usefully occupy further time.

Justice FRY said he did not see how the injunction could be resisted.

Mr. SMITH said the question was a very important one to his clients. He understood the position thus: The relators charged specific nuisance on specific days, and, upon the evidence, his lordship had considered that the importation of foul lime had caused part of the nuisance.

Justice FRY said the case stood in this position: On the previous day the defendant admitted there was a public nuisance——

Mr. SMITH: Upon the days charged.

Justice FRY: And set up a justification that they could not comply with the Acts of Parliament without committing a nuisance. But now it appeared they had brought lime from other works to Bromley, without having any authority for so doing. The question was, whether they were justified in doing that by any statutory authority. Could the defendants, by evidence, show that a considerable portion of the annoyance which was admitted to be due to an act not obligatory upon them to do, had not been caused? But, perhaps, it would be more convenient to go on with the case.

Mr. SMITH said he did not wish to do so after the intimation from his lordship. He did not wish to consent to the injunction as prayed, though he did not object to one restraining them from importing lime from other works.

Justice FRY said he should not stop the case.

Dr. *Charles Meymott Tidy*, examined by Mr. SMITH.

I am familiarly acquainted with the manufacture of gas scientifically. I have seen how the defendant company's works at Bromley are conducted. The last occasion when I visited them was the 25th of June, 1877.

Justice FRY remarked that the visits of the defendants witnesses were outside the periods complained of.

Mr. SMITH admitted that was so, but the processes in use were the same.

Examination continued: In order to bring gas to the purity required by the Referees, I consider it absolutely necessary to use lime. I myself saw the purifiers opened. The method in use for aërating them was described to me. Air had been drawn through them for 18 hours, and then passed through oxide of iron. I agree with the evidence given by Dr. Odling. In my opinion, the best known means have been adopted at the Bromley works for purifying the lime, so as not to create any nuisance. I am unable to suggest anything by which it can be done better. I do not know of any gas-works where a shaft has been built for the purpose of removing the nuisance. I should not like to say there is one.

By the COURT: I think taking the gases up to a considerable height, and so increasing the extent of dilution, must reduce the nuisance.

Cross-examined by Mr. KAY: I am not able to suggest any better process than the one now in use. Although I am perfectly ready to admit that, on a small scale in the laboratory, a process can be adopted which would, perhaps, be more efficient; it certainly is not a process that one can employ upon a large scale. A theoretical process upon a few feet of gas is not a process which can be adopted with 5 million feet. I did not observe the condition of the air which had been passed through lime, and then treated with oxide of iron. The air as it is passed through the purifiers takes up sulphuretted hydrogen, together with other gases; it is then passed through the oxide of iron, when the sulphuretted hydrogen is taken out, but not the other gases.

By the COURT: From the foul lime are given off sulphuretted hydrogen and other compounds. The air, on passing through the oxide of iron, gives up sulphuretted hydrogen.

Cross-examination continued: I do not know of any means for mitigating the nuisance arising from the other sulphur compounds. If required, no doubt I could make a new suggestion every day for effecting this; but I doubt if any of them would be successful. I am decidedly of opinion that a shaft might mitigate the evil. I should not like to say there would not be any nuisance by using a shaft. I am convinced of this, that the nuisance arises from the opening of the lime purifiers—by the disturbance of the lime—and any amount of air passed through does not seem to obviate that. I saw a great many precautions taken in emptying the purifiers; for instance, I was informed they had been ventilated for 18 hours. I saw a hose with a plentiful supply of water. I know of no precaution which would remedy the nuisance. I think when we are talking of purifiers it scarcely occurs to us that we are dealing with 70 or 80 tons of material—it is an enormous quantity. This mass of material makes it difficult to deal with in the mechanical arrangement. If you have only a few tons to deal with, it is a very easy matter to remove it without creating much nuisance; but it is quite another matter when you have an enormous quantity to deal with.

By the COURT: It is very possible that, with some extraordinary arrangements, things might be improved. In a laboratory the thing can be done perfectly; but a theoretical experiment is not a practical one.

Cross-examination continued: In the case of a laboratory, you can have a fine drawn-out glass tube, and pass bubble after bubble very slowly; but this cannot be done in practice. A great deal depends upon the speed.

Justice FRY said he did not think it worth while to pursue that point further.

Cross-examination continued: I recollect being present at the Bow Common Gas-Works on June 2, 1877, when a purifier was opened, from which there was very little smell. I do not know how long the lime had been in that purifier, but I may say I have very great doubts in my own mind as to the conditions of that experiment; but I refuse to give any evidence on the point.

Re-examined by Mr. SMITH: I saw the purifier opened at the Bow Common works; it did not smell. I do not know what it had been used for, and I have very great doubts about the experiment.

Dr. *Theophilus Redwood*, examined by Mr. SMITH.

I have been to the gas-works at Bromley several times—I believe on four occasions. The first occasion was the middle of July, 1876.

Justice FRY remarked that this was after the period complained of.

Mr. SMITH concurred, but said he would call the overseer to prove the works were carried on in the same manner then as they had been previously.

Examination continued: I saw a purifier opened on the occasion that I was there. I made myself acquainted with the manner in which the foul lime had been ventilated. I saw the works with regard to the oxide of iron purifier. In my opinion, and regarding the knowledge persons have as to the purification of lime, everything then known was done to purify it. It is a well-known thing that the opening of lime purifiers creates smells. I have never known of a shaft being built in gas-works to carry off the fumes from the impure gas after it has passed the oxide of iron purifier. I think in this particular case a shaft would not mitigate the evil. My reason for saying so is that the evil complained of is experienced at a considerable distance. Passing the gases up a shaft would cause them to travel a great distance, but not to a greater distance than they are found to travel in this instance without a shaft. In my opinion, there would be great danger in passing the foul gases, after leaving the oxide of iron, through a furnace. I know no better way of purifying the lime than is now in use.

Cross-examined by Mr. KAY: I have not seen a shaft used for this purpose, but shafts have been used for a somewhat similar purpose, and have not been found to be successful—as, for instance, at alkali works. The immediate neighbourhood would be relieved by a high shaft. If carried to a greater distance by a shaft, the smell would not be more diluted and dissipated at distances such as are complained of here. The gas near the ground, or high up in the atmosphere, would similarly become diffused and rendered less noxious. If sent up a shaft 150 feet high the nuisance would be experienced a mile and a half off. The gas is heavy gas, and tends to fall. The effect would be quite as great after passing through a shaft 150 feet high. The great nuisance is caused by the emptying of the purifiers. The practice adopted is to have, by mechanical means, a strong draught of air passing through the purifiers while being emptied. This goes on during the whole process of emptying. I see a reason why that should not be made perfect so as to prevent the escape of noxious vapours. When the lime is taken up on to the shovel it is disturbed, and the current of air is not sufficient to prevent the escape of foul gas. I do not see how the current of air could be made sufficient to prevent the escape of noxious gas. If by any arrangement a sufficient current of air could be sent into the purifiers while the men were removing the lime, an escape of gas might be prevented. Then there would only remain the nuisance occasioned by the escape of gas while the lime was being put into the waggons, and, again, while passing from the waggons to the tip. But if the current of air passing through were far greater than it is during the process, the amount of gas escaping from the lime would be diminished. If you passed the lime from the purifiers through a closed shoot, the end of the shoot being in a purifier, and put it into a closed waggon, that might be made sufficient means of reducing the nuisance.

Re-examined by Mr. DAVEY: I do not know any practical means by which the current of air could be materially increased. I have never heard of any means by which this could be done.

Mr. DAVEY said that, during his absence from the Court, he understood Dr. Odling had been examined, and he had expressed an opinion that the quantity of foul lime brought to the works had materially increased the nuisance, or was the main cause of it.

Justice FRY said Dr. Odling did not go quite so far as that. It was stated on the previous day, in evidence, that two-thirds of the lime was imported from other works, that it was brought in barges, and Dr. Odling's

evidence went to prove that the disturbance of this foul lime, which was not innocuous, created a considerable nuisance.

Mr. DAVEY said, from his recollection of the evidence, no foul lime had been brought on the property since September, 1876, and the writ was issued in May, 1876. They were in this difficulty, that, supposing his lordship should be of opinion that the relators were entitled to an injunction with respect to the foul lime, but in favour of the defendants on the point that they were using every practical means for doing away with whatever nuisance might be occasioned by discharging the purifiers, would the company not be entitled to ask that the injunction should be confined to bringing foul lime on to the premises?

Justice FRY said he had to try the question whether the company were, at or before May, 1876, causing a nuisance. It was said that the nuisance had increased.

Mr. DAVEY said he could prove that the directors had spared no expense in the matter.

Justice FRY said that when Mr. Vernon Harcourt went to the works at the end of 1876, the only precaution he saw being taken was putting breeze over the foul lime, but now it was shown that other precautions were taken.

Mr. DAVEY had not the slightest doubt that, in their anxiety to prevent a nuisance, a great many things had been tried. The question to be considered was whether, having regard to the state of knowledge at the time the writ was issued, proper precautions were taken to prevent a nuisance. It might be they had exceeded their powers by bringing the foul lime from their other works, and yet his lordship would not be disposed to grant the injunction as prayed.

Justice FRY said that, unless the defendants could discharge the burden of proof that they were bound to create a nuisance, the injunction must go. They had assumed the burden of proving that they could not perform the obligations thrown upon them by statute without creating a nuisance, but it appeared they had brought the nuisance from another place.

Mr. DAVEY asked that the injunction might be confined to bringing foul lime from other works.

Justice FRY said he could not accede to the application. The defendants had better proceed with their case.

Mr. DAVEY said, as the matter was of great importance to his clients, he would proceed with the case.

Mr. *Robert Paulson Spice*, examined by Mr. DAVEY.

I have given much attention to gas-works, and have had great experience in the manufacture of gas. I have had my attention directed to the purification of lime from sulphur compounds, and to the annoyance occasioned by the discharge of the lime purifiers. I have been to the Bromley works on several occasions. From my inspection of the works, I do not think there is anything the company can do which is not done for the removal of the nuisance. My impression, after going into the matter carefully, is, that instead of not having done enough, they have done too much; that what they have done has tended to increase the evil, rather than diminish it.

Justice FRY: Then they could improve it by doing less?

Witness: They had better do nothing than what they have done.

Your evidence is almost too good?—It is a fact. If the company had not passed air through the purifiers, it would have been better. I have known steam tried by some with success, but Mr. Wright had tried everything I could think of. I think the ventilation process has done harm.

Examination continued: In the month of May, 1876, I had an acquaintance with the means in use for reducing the annoyance. Having regard to the state of knowledge at the time, there were no means which could be adopted which have not been tried at these works. So far as my observation went, I detected no imperfection in the apparatus at Bromley. I think it was perfect. If you enclosed the sheds in which the purifiers are kept, the men would be unable to work, in consequence of the dust. No known precaution was omitted in removing the lime from the purifiers. The spent lime was transferred from the purifiers into waggons, in the usual way. I cannot suggest any better way of doing it. Pouring water on the lime prevents the dust flying about. The lime is, in point of fact, not dry, except the process has been carried on too long.

Cross-examined by Mr. KAY: It is a maxim of our profession that nothing is impossible. If the company were to say to me, "Do not regard money for a moment, or trouble, or time, but see whether you can devise an improvement in the process," I should apply myself to the matter, and see if I could succeed, although I doubt whether I should be successful. While the purifiers are being emptied, air is drawn through them to take the foul gases away. I think that, by engineering appliances, that might be done in sufficient quantity to take it all away. If air were drawn in in sufficient quantity to take all the gases and smell away, there would be no difficulty in emptying the purifiers in a closed room. I cannot see my way to construct a room so contrived, with an orifice for the admission of air, and air drawn in by mechanical means, as to make the air innocuous for the men to work in. I have heard of Denarouze's apparatus, by which men can work in a foul room. By using this helmet-like cap the men could work in an enclosed room, but there would still be a nuisance when the waggons were opened. If the waggons were taken ten miles away before being opened, the nuisance would simply be removed ten miles.

Re-examined by Mr. DAVEY: I do not know of any means by which the nuisance can be avoided. It may be overcome one of these days, no doubt. If I had a commission from the company to improve the process, I doubt whether I should succeed. I should not set about it very hopefully.

Justice FRY said there was one question he had omitted to ask Dr. Odling.

Dr. *Odling*, recalled.

Justice FRY: What is the effect of water upon foul lime chemically?

Witness: It has no direct chemical effect; it prevents so large a surface being in contact with the air. It makes it into a mass. It lowers the temperature, and prevents the giving off of dust. The effect of water is to diminish the quantity of foul gas given off. When the lime is hot, there is a passage of air through it, and a great quantity of vapour is given off which counteracts the effect of the water. Still I think water does good.

Mr. DAVEY said he thought the suggestion as to the use of water was first made by Mr. Vernon Harcourt. He did not think it had ever been tried or thought of before that time. Perhaps his lordship would allow the question to be put to Mr. Harcourt.

Mr. *Vernon Harcourt*, recalled.

Mr. DAVEY: Do you agree that the suggestion was first made by you?

Witness: Yes. The suggestion was made by me last winter. I believe it was not before then.

Mr. DAVEY asked whether his lordship would allow him to put a question to Mr. Wright as to whether he adopted the process as soon as it was suggested by Mr. Harcourt.

Justice FRY: Certainly.

Mr. *Wright*, recalled.

Mr. DAVEY: Did you adopt Mr. Vernon Harcourt's suggestion of watering the lime when discharging the purifiers?

Witness: I do not think Mr. Harcourt suggested it to me. He suggested it to those at Fulham. I heard of its being done there, and then I did it. I believe I adopted it some time this year.

Cross-examined by Mr. KAY: I adopted it at Bromley some time this year. I cannot say nearer than that. It was done when the purifiers required it. They were not always dry, and, therefore, they did not require it.

By the COURT: It was used when the lime required it.

Mr. *Thomas William Keates*, examined by Mr. DAVEY.

I am chemist to the Metropolitan Board of Works. I have directed my attention to the purification of coal gas. I am the superintending gas examiner to the Metropolis, and was for many years chemist to one of the gas companies. I have directed my attention to the methods employed by the companies for preventing a nuisance when discharging lime purifiers. I visited the Bromley works twice in July. I have seen the purifiers opened, and I investigated the way in which the process was being carried on. So far as my knowledge goes there are no means, by which the smell may be avoided, which have not already been adopted. The great thing to do is to get the lime as quickly as possible out of the purifiers. I think the operation might be mechanically improved; but the nature of the operation could not be improved. By mechanically I mean that it would be better if the air were broken up in the various layers instead of being drawn through the layers one after the other. I do not know whether that plan has ever been tried. I could not suggest any precautions which should be taken in working, and which are neglected. When I was at the works the lime was being watered, and every precaution taken.

Cross-examined by Mr. KAY: I was called as a witness, and gave evidence before the committee of the House of Commons in May, 1877. I then said I had had opportunities of considering the question of removing the nuisance, that I was of opinion the nuisance had been exaggerated, that the sulphur compounds could be removed to a moderate extent without creating any nuisance, and that it would mainly depend upon whether the lime could be removed without creating a nuisance. That is still my opinion. I also said that I had completely disinfected some lime, rendering it perfectly innocuous. That I did at the Dover works. I also stated that upon the occasion of my visit to the Bromley works, in 1874, the lime in all the trays was completely disinfected. At the present time, air is drawn through the purifiers to purify them, but I think if fresh air was drawn in over the surface of each tray it might be more effectual. If you put the question of convenience and inconvenience and expense aside, I do not doubt but that the nuisance could be removed.

Justice FRY: Could it be done on a large scale if the question of expense were not considered?

Witness: It might be; but that is a question for the engineer.

Cross-examination continued: I said before the committee that the lime removed from the purifiers was completely disinfected, and that I understood the process was in current use as far back as 1859. If I remember rightly, evidence was then given of the fact that sulphide of calcium could be converted into carbonate of lime, and that it would then be innocuous.

By the COURT: That process has been tried over and over again, and has practically broken down now.

Cross-examination continued: I also said before the committee of the House of Commons that the Fulham works were always being complained of, but it did not follow that the cause of annoyance could not be remedied, and that I was told it would very soon be remedied. Also that it was well known that, by passing crude gas through the purifiers, you could convert the foul lime into carbonate of lime, and that that process was in use at the Bromley works in 1874. I do not know whether they adopted my suggestion of drawing in air between the trays. I do not think there is any difficulty in adopting that plan. The great object was to get the foul lime out of the purifiers as quickly as possible, because it was a stinking thing. Everything used in the manufacture of gas acquires a gassy odour, even if the sulphuretted hydrogen has been removed; therefore it is desirable to remove all the materials quickly.

Re-examined by Mr. DAVEY: To pass air between the purifier trays would require an alteration of the apparatus, but I do not know whether that is now being made. The process which I described before the committee of the House of Commons as being carried on at Bromley, consisted of passing gas through the purifiers upwards, and afterwards drawing air through downwards. By so doing, the crude gas changed the condition of the lime in the lower trays, and the air coming down changed the condition of the lime in the upper trays. Where sulphide of carbon is acted upon in that manner, sulphuretted hydrogen is drawn out. I know that in 1874 the company were prosecuted for committing a nuisance. Whatever means the company then adopted for removing the nuisance, they were not successful.

John Wackrill, examined by Mr. SMITH.

I have been engaged at the Bromley Gas-Works since their opening. Various experiments have been tried as to the best means of purifying gas, and from time to time, as those experiments failed, they were discontinued. Orders were given to use breeze, and, in consequence of those orders, we have always used it.

By the COURT: I cannot say when we first began to use breeze, but it has always been used on the tip. It has been used there since the commencement of the works, but I do not think it was used in the purifiers. I do not think anything was used in the purifiers at first.

Examination continued: Breeze has been used other than at the tip, but I cannot say how long it has been in use in other parts of the works. It has been used for distributing over each bed of lime in the purifiers. When one tray is removed breeze is put on to the next, and so on. Breeze is also put on the trucks and wheelbarrows, but not on the bags or baskets. Water has been used for some months.

Cross-examined by Mr. KAY: The breeze is obtained from the coal used in the works, and the supply is more than sufficient for all purposes. I will not swear that the use of breeze has not been omitted. I do not think it makes much difference whether it is put on or not. I only put it on because I am ordered to do so. The thickness it is put on varies from half an inch to two inches. I never notice any difference whatever thickness of breeze is put on, except in the time it takes to put it on.

By the COURT: On an average, it is put on to the thickness of one inch.

Cross-examination continued: The breeze is put on, and then the lime is shovelled out into bags, baskets, or barrows, and cast into the waggon. When in the waggon breeze is always put on. That is never omitted. I do it, not because I think it does any good, but because I am ordered to do it. Breeze has been put on the purifier trays at Bromley for two or three years. It is my duty to superintend the opening of the purifiers. Air is always drawn through the purifiers when they are being cleaned out. That practice commenced in 1875, and has been continuously done. It has been omitted sometimes, when a break-down has occurred with the exhauster. Some of the men have a piece of cloth over the nose and mouth when cleaning out the purifiers. I do not take any notice of the smell. I have had instructions from Mr. Wright to do all I thought was possible, and to spare no expense in the shape of putting breeze, keeping everything as clean as possible, and ventilating the purifiers so as to avoid creating a nuisance. I am generally so busy that I have not time to attend to the stink. I do not attend to the amount of stink there because

I am no judge of it. I very often hear complaints from people about it but I do not notice it.

By the COURT: The smell does not trouble me.

Cross-examination continued: As a rule, I do not take any notice of the smell.

By the COURT: We always use breeze, but clay has been used. The rubbish brought in by neighbours is used on the tip, but not in the purifiers. Spent lime has been used occasionally on the tip. The breeze used in the purifiers is sometimes wet and sometimes dry, just as it happens to come in from the yard.

John Johnson, examined by Mr. DAVEY.

I am the yard foreman at the Bromley Gas-Works, and have been so for three years. My duties are to keep everything clean, and to cover over the refuse lime on the tip. I cover it with dust, and breeze, and lime, which has been lying for two years. The lime, when discharged, is always covered with breeze or dust. Cinders are quite as efficient as breeze.

By the COURT: It is screened before being used.

Examination continued: It is part of my duty to look after the breeze and cinders. There is always a sufficient stock.

Cross-examined by Mr. KAY: The stuff is tipped so as to form a great heap—I should say it is ten feet high. Rails are laid on an embankment of the spent lime, the waggons run along, and the stuff is pitched down the slope. The slope is always covered with breeze. I cannot say whether on an average one purifier is opened every day. I do not know that the company keep a record of the times when the purifiers are opened. Old lime with breeze is used to cover up the new lime—it is all used together.

Re-examined by Mr. DAVEY: From ten to twelve men are employed to cover up the lime.

Mr. DAVEY: That will be our case, my lord.

Mr. SMITH said it now became his duty to sum up the evidence on behalf of the defendants, and, in doing so, he did not intend to address his lordship with regard to the importation of foul lime to the *locus in quo*.

Justice FRY said he considered that matter of great importance to the defendants. He should be glad to be addressed upon everything the defendants considered material.

Mr. SMITH said, on behalf of his clients, he must admit that they could not insist that they were bound in any shape or way to bring foul lime to the *locus in quo*. As they could not set that up as a matter of law—and, upon the evidence as it stood, the importation of lime was proved to have created a nuisance—he would only be stultifying himself were he to resist an injunction being granted.

Justice FRY considered Mr. Smith was putting the case too high against himself. If the company could show they had authority for doing what they did, that would be enough.

Mr. SMITH said he could not argue that they had authority to bring the lime to the *locus in quo*. He did, however, ask his lordship's attention to the other parts of the case material to his clients, the gas company. As he understood, they were attacked on two grounds. The first ground was that they had not used the best means of purifying the lime in the purifiers, and so created an obnoxious nuisance when the purifiers were opened. It would also be said they had been guilty of creating a nuisance by depositing the lime from the purifiers upon their own land, and that they had not used, in the process of tipping, those precautions which science dictated, and which reasonable men would have done. In the first instance, he would direct his lordship's attention to what they had done, or omitted to do, with regard to the purifiers, and, in so doing, he would take Mr. Vernon Harcourt's evidence as to what might have been done. Beyond all question, in order to comply with the requirements of the Referees, as to the maximum amount of impurity which should be permitted in the gas, the lime process was necessary. Therefore, he started with the proposition that there was a necessity upon the company to use the lime process; and he had proved beyond all question that the use of the lime process was liable to create a nuisance. He thought he might put his case quite as high as that. That they had created a nuisance was admitted by his friend, Mr. Benjamin. Then they came to the question whether they did or did not, in the use of that process, exercise all the means which experience dictated; and in order to see whether they had or had not done so, he would refer to the evidence given by Mr. Vernon Harcourt. That gentleman had been asked whether at the company's works he had observed any precautions taken in emptying the purifiers so as to prevent the escape of noxious vapours, and in reply he stated that, at Fulham, various precautions were taken; that the lime was covered over from the time of opening the purifiers to the time of removing the lime in barges. That was No. 1 suggestion. No. 2 was that when the lime was in a dusty condition, and liable to be blown about, it was watered. The third suggestion was that they were in the habit of drawing air down through the purifiers to ventilate them, in order to make the lime less offensive when removed. Then came the question whether those things had not all been done at the works in question.

Justice FRY remarked that, at the present moment, he did not think they had been done.

Mr. SMITH said, in determining that question, the opinion of one witness would be weighed against the opinion of another.

Justice FRY said the *onus probandi* was upon the defendants.

Mr. SMITH said he was fully aware of that fact. Now, what necessary act had the gas company omitted to do in the year 1875-6, which, according to known science at the time, they ought to have done?

Justice FRY said they ought to have covered over the wheelbarrows with breeze.

Mr. SMITH replied that the wheelbarrows only went from one corner of the purifier-house to the other corner. The witness Wackrill had stated that his orders were to do everything to keep the works clean, and to alleviate the smell, and it could not be proved that the company had spared any expense in doing all that was necessary. Immediately the lid was taken off a purifier it was proved that the first thing done was to put pure, clean-sifted breeze on to the top of the lime.

Justice FRY said there was no evidence to show that that had been done during the whole period.

Mr. SMITH said he thought that was not quite so. But, if driven to it, he would rely upon the evidence given by Dr. Odling, that the breeze did not make much difference. He did not wish to rely upon that, if the evidence would bear him out, as he thought it would, that breeze always had been used. With regard to the second suggestion of Mr. Vernon Harcourt, that water should be poured upon the lime to lay the dust, it had been proved by Dr. Odling that the nuisance was not caused by the dust being carried to a distance of three miles. He did not believe that dust could be carried by the wind for that distance. No doubt the learned counsel for the relators would say, if water would lay dust that was common knowledge, and the company ought to have used water. But he would remind his lordship that the use of water was never suggested by any one until Mr. Vernon Harcourt, in 1876, communicated it to the company, and directly that suggestion was made it was acted upon.

Justice FRY inquired whether Mr. Smith thought the water did any good.

Mr. SMITH, in reply, said that when such gentlemen as Dr. Odling and Mr. Vernon Harcourt said it was of use, he must admit it did do good. But he should suggest that the dust was not the cause of the evil complained of.

Justice FRY said that Mr. Vernon Harcourt's strong point was the dust, though Dr. Odling differed with him in that respect.

Mr. SMITH replied that the use of water had not been suggested by Mr. Vernon Harcourt till the end of 1876, and from that time it had always been used. Then they had to contest the second suggestion of Mr. Vernon Harcourt—namely, that of keeping the whole of the foul lime under cover from the time it came out of the purifiers until it was sent away in the barges. It was suggested by the relators that the purifiers should be in a covered building, but it was clear from the evidence that if they were enclosed, the men would not be able to work, and Mr. Vernon Harcourt had not been able to mention a single gas-works where the purifiers were so enclosed. With regard to the third head of complaint, the want of ventilation, he challenged his friends to put their finger upon any company who had worked more efficiently than the defendant company had done.

Justice FRY said that was not the question he had to try. He did not see why the sides of the purifiers should not be enclosed.

Mr. SMITH said, assuming the whole purifier were put in a covered house, the nuisance would in no way be diminished, because the gases would escape when the lid of the purifier was taken off. The nuisance was really caused by the shovelling of the lime from the purifiers. If it could be shown that putting the purifiers under cover did away with certain gases, there might be something in the suggestion, but the evidence proved quite the contrary. Therefore he submitted, upon the evidence of Dr. Odling and the other gentleman whom he had called, that the works were conducted in an efficient manner, he had a strong case upon that point. With regard to the ventilation of the purifiers, various suggestions had been made by his learned friend in cross-examination, and Mr. Vernon Harcourt stated that at Fulham they were in the habit of drawing air down into the lime in order to make it less offensive when removed. The evidence proved that at Bromley they had been trying experiment after experiment, and did pass air through the purifiers downwards, and by means of an exhaust-pump they withdrew the air and passed it through oxide of iron.

Justice FRY said he thought the absence of ventilation on the occasion of Mr. Vernon Harcourt's visit was due to an accident.

Mr. SMITH said he had no doubt the absence arose from some breakdown. Then came the question, whether they had used the most efficient means of ventilation. They had been making experiments on the subject; they had had one or two explosions, and he did not know that his friends could say there was any process which had not been tried. Perhaps they might say the suggestion of Mr. Keates had been neglected, but that had been tried once at the Bromley works, and was given up, conclusively showing that the means were not effectual.

Justice FRY remarked that Mr. Keates said his process turned 90 per cent. of the lime into carbonate of lime, and when reduced to that small amount it was absolutely innocuous. He saw no reason why that should not be done.

Mr. SMITH said if the process had done all it professed, its use would not have been discontinued.

Justice FRY said that perhaps it was given up on the ground of expense.

Mr. SMITH replied that all the evidence went to show that the company had spared no expense in the matter. He submitted they had used every known means to prevent a nuisance.

Justice FRY said that Dr. Tidy had successfully carried out the process in the laboratory. Whether or not it could be done with perfect success in gas-works was not a question for them, but for gas engineers. It was true that Mr. Spice seemed in rather a hopeless state with regard to success.

Mr. SMITH said that many things might be done in a laboratory which could not be done on a large scale. The apparatus could not be made hermetically tight, and explosions would take place. No evidence had been given to show that any process which had been tried and proved successful had been discontinued. Then it was suggested by the relators that the company should have erected a shaft, but the evidence proved that no single gas company in England had a shaft. It was true that one witness thought a shaft would be efficacious, but others thought it would not be, and their evidence must be weighed against that in favour of the shaft. It was also suggested they should have an innumerable number of oxide of iron purifiers; but the evidence was overwhelming that the oxide of iron as now used was more than sufficient for the purpose required. Then it was suggested they should have a furnace, but that had never been pointed out by Mr. Vernon Harcourt. The Imperial Company had tried the experiment of a furnace, and the result was an explosion. He was certain his lordship would not say they were to run the risk of an explosion, because it was suggested that by putting water between the furnace and the purifier the operation might, perhaps, be performed without an explosion. The next point suggested was that they should have trays fitted, so that they could be drawn out; but no engineer had been called to prove that this could be done. It was part and parcel of the necessities of the purifiers that they should be absolutely air-tight, and he should like to know, if the trays were made to pull out, what sort of a purifier it would be, and whether they would not have more complaints of foul air than they now had. The purifiers were hermetically sealed, and, when they were emptied, the company took the best known means for preventing any annoyance. Then it might be said they should not tip the foul lime upon their own land.

Justice FRY asked whether the depositing was a necessary part of the transaction.

Mr. SMITH said it was the shovelling over of the lime which caused the nuisance. What were they to do with the lime? It was conceded they must have lime, and that they must take it away.

Justice FRY said they might throw it into the German Ocean if they liked.

Mr. SMITH said before doing that it would have to be taken out of the purifiers. The case made against them by the evidence of Mr. Allen was that a nuisance was occasioned when the purifiers were opened.

Justice FRY said that complaints were also made when the purifiers were not open.

Mr. SMITH said the evidence of Mr. Allen came to this—that whenever he smelt a smell and went to the works he found a purifier open. It was clear that when once the spent lime was placed upon the *locus in quo* and covered with breeze there was no further smell.

Justice FRY thought that was so.

Mr. SMITH said if that were the case he should like to know where was the evidence that they committed a nuisance by keeping the lime. Upon that point the relators had, as he submitted, totally failed.

Mr. KAY remarked that Mr. Davey had stated that in the Acts of 1854, 1860, and 1847, there was nowhere anything with regard to nuisance; but in the Act of 1847 there was a clause which stated that nothing in that or the special Act contained should prevent the company from being liable to an indictment to which they might be liable in consequence of making gas; and *Broadbent v. Imperial Gas Company* was decided upon that very section.

Mr. SMITH said that proviso only referred to the manufacture of a residual product, and, although it stated nothing should prevent them being liable to an indictment, it did not take away the defence they would have had before the passing of the statute.

Justice FRY said Mr. Davey had put his case as follows—that they were under an obligation, and had authority, to manufacture gas; that they were justified in committing a nuisance, if they could not make gas of the required purity without so doing. He had asked whether there was anything in the general Act about nuisance, and was told there was not. But Mr. Kay now pointed out a section referring to nuisance, and he should like to know whether that did not take away the whole foundation of the argument.

Mr. SMITH submitted that it did not, and that they had the same defence as before.

Justice FRY said there was statuory authority to create a thing so long as they did not commit a nuisance; how did that statutory authority give the right to create a nuisance?

Mr. SMITH argued they had power, under the Act of 1860, which only incorporated the Act of 1847 so far as the provisions were connected with those in the Act of 1860. He did not know that he could usefully occupy time longer, and therefore, with those observations, he would leave the case in the hands of his lordship.

Without calling on Mr. Kay for a reply,

Justice FRY, in delivering judgment, said: This is an information filed by Her Majesty's Attorney-General, upon the information of the Local Board of West Ham, against The Gaslight and Coke Company, and it prays for an injunction in general terms to restrain the defendants from carrying on the business at their manufactory, or any of the processes there carried on, in such a manner as to cause a nuisance to the neighbourhood. The manufactory in question is situate at Canning Town, not far from the shore of the Thames. This information was filed upon the ground of a public nuisance being occasioned to Her Majesty's subjects. Now, it was admitted by the learned counsel for the defendants that a public nuisance had been created, and, therefore, it would appear, at first sight, a matter of course that an injunction should go in the terms of the prayer. But then the learned counsel for the defendants said they were justified in creating the nuisance, and their argument was this—that they were under an obligation to supply gas to a given metropolitan district, as defined by the Metropolis Gas Act of 1860, and that further, by the effect of the Imperial Gas Act of 1869, they were under an obligation to supply that gas with not more than 20 grains of sulphur compounds, other than sulphuretted hydrogen, to every 100 cubic feet of gas manufactured and supplied. They said, further, that under the Act of 1869 they had authority to take the land upon which they are carrying on their manufacture at Canning Town, and they said, as matter of fact, "We undertake to prove that we cannot perform the obligations cast upon us by the Acts of 1860 and 1869, without creating a nuisance, and therefore we are justified." Now, I think to that line of argument two sufficient answers have been given. In the first place, it is to be borne in mind that the Act of 1847 contains an express provision that nothing in that Act or the special Act shall prevent the undertakers from being liable to any legal proceedings to which they may be liable in consequence of making or supplying gas. It is to be borne in mind that that Act, except so far as the provisions were inconsistent with the Act I am about to refer to, was incorporated in the Metropolis Gas Act of 1860; and, therefore, I take it to be clear that the whole of the obligations imposed by the Act of 1860 were made liable to that condition, and that a gas company performing the obligations of the Act of 1860 could not justify themselves for committing a nuisance by setting up their incapacity to supply gas without creating a nuisance. I therefore think that the foundation of that argument fails upon the question of construction. But, even if it does not do so, I am of opinion that the defendants have not succeeded in their justification. It is to be borne in mind that they have the full burden of proof in this case; for it naturally rests upon those who say they cannot do what they are bound to do without creating a nuisance. That would be the result of ordinary law upon the subject. In this case it is especially so, because the provision which fixes the maximum of impurity allowed, which is to be found in the Act of 1869, is in these terms:—The Act first appoints Referees, who are to consider the means to be adopted for purifying gas and preventing nuisance; then it provides that the Referees shall, from time to time, ascertain with what degree of purity the company can reasonably be required to make and supply gas continuously, without occasioning a nuisance to the neighbourhood in which the works are situated, and thereupon prescribe the maximum amount of impurity. Now, those gentlemen have, in the discharge of their duty, fixed the maximum, and they have fixed it at an amount which, in their judgment, may be reasonably required without occasioning a nuisance to the neighbourhood in which the works are situated. There is, therefore, the judgment of public officers appointed for the purpose, to the effect that this maximum can be attained without occasioning a nuisance to the neighbourhood. The defendants say, and say truly, that in this Court the judgment of the Referees is not binding, and that they are at liberty to show that the Referees have fallen into error. They have, accordingly, had an opportunity of so convincing me, if they could do so. They have given abundant evidence with that view; but they have failed, in my judgment, to discharge the burden of proof cast upon them by general law, and cast upon them by the particular section of the statute to which I have referred. It is not necessary for me to say whether, if it had been, I should have come to the conclusion that the gas might have been made without creating a nuisance. It is enough for me to say that the defendants, on whom the burden rests to prove they cannot reach the required purity without committing a nuisance, have failed so to convince me. Now, I have had before me the evidence of many gentlemen. Mr. Vernon Harcourt, one of the Gas Referees, has confirmed on oath the opinion which he had given as a Referee. He visited these works in January of this year, and the result of the evidence on the part of the defendants is, that I must take the mode of proceeding at that time to be at least as favourable as it was during the period which is in controversy in this litigation. Mr. Vernon Harcourt has pointed out what he considers to be the defects in the precautions taken by the defendants at the Bromley works, and he has contrasted the mode in use there with the mode in use at Fulham. In his opinion, the Fulham process is conducted more carefully, more skilfully, and is better adapted to prevent nuisance than the process in use at Bromley. Has that been displaced by the evidence or by law? In my opinion it has not been. I am not convinced, upon the evidence, that there has been throughout the whole period in controversy—from May, 1874, to May, 1876—due care taken in the covering up of the foul lime. I am not convinced that breeze was used freely or effectually during some of the earlier stages while the lime was in the purifiers. I am not convinced that with a little more diligence, zeal, and expense other methods might not have been used, applying common knowledge to the circumstances of the case, which would decidedly have been more effectual. On the contrary, I think the evidence goes rather strongly to show that there were methods, which had been used earlier than 1874, which were more successful than the methods used during the periods to which this litigation relates. In coming to this conclusion, I do not base my opinion upon the evidence of Mr. Vernon Harcourt alone, for I have the evidence of Mr. Kirkham and Mr. Keates, who both testified that something more might have been done. Nor is that conclusion, in my mind, disturbed by the evidence given by Dr. Odling and the other witnesses who were called on behalf of the defendants, because they do not pledge themselves to say that nothing more could be done than was done. Therefore, I can only come to the conclusion that the defendants have not done everything they could possibly do to prevent a nuisance to the neighbourhood, and that they have not discharged the burden cast upon them, even if discharging it were a justification. In my opinion, it follows, from what I have already said, that the injunction must go. But there is one other fact, which is conclusive of this litigation, irrespective of the conclusion at which I have already arrived, and it is this—that from some time in 1874 down to the month of September, 1876, the whole of the refuse lime from three other works belonging to the company was brought in barges to this land, was transhipped from the barges into trucks without being covered over with breeze or anything else to protect it from the operation of the air, and then carried in those trucks and tipped out on to the land. The evidence before me is conclusive, in my mind, to show that the operation was attended with a great increase of the nuisance created by the works. It was estimated by Dr. Odling, and probably estimated correctly, at something like one-half of the whole of the smell and nuisance which resulted from the operations carried on in that manner. Now, it is contended, that there was no obligation upon the company to bring that lime upon the land; and, with regard to that, it appears to me the defendants case is clearly an undefended one, and that the suggestion that the injunction should be limited, because this act is not itself connected with the immediate process of manufacture upon the land, is not well founded. It appears to me that during the period in controversy the defendants were committing upon their land that which was deemed to be a public nuisance, and that they were not doing it under statutory obligation. The injunction must therefore go in the terms asked for, and the costs must be paid by the defendants.

Mr. DAVEY asked whether his lordship would suspend the injunction for a reasonable time.

Justice FRY inquired what time the defendants asked for.

Mr. DAVEY said he was instructed to ask for six months.

Justice FRY said that was an unreasonable period to ask for, especially after the company's own engineer had stated that the injunction, if granted, could be obeyed.

Mr. DAVEY asked whether his lordship would suspend the injunction for three months, with liberty to apply.

Justice FRY said he could not refuse liberty to apply, but he knew what the result generally was—that nothing was done until two months and a half had expired.

Mr. DAVEY said he thought he might venture to say, on behalf of the company—and the evidence given would support his statement—that they were trying to do what they could to improve matters.

Justice FRY said he thought three months was not an unreasonable time to ask.

Mr. KAY said, upon Mr. Davey's assurance that the company would do what was right to remedy the nuisance, he would not object to three months being given.

Justice FRY said that any further application upon the subject should be made to him.

Mr. KAY said if any application were made, he should remind his lordship of the assurance given by Mr. Davey on behalf of the company.

Mr. DAVEY; All I said was this——

Mr. KAY said if his learned friend did not mean that they would at once do what was requisite, he must object to three months being given.

Mr. DAVEY said all he meant was that they would be quite sure to obey the Act of Parliament.

Justice FRY said the injunction would be suspended for three months, and he held out no encouragement that an application for an extension of time would be successful.

WARWICK COUNTY COURT.—TUESDAY, Nov. 6.

(Before Sir RICHARD HARRINGTON, *Bart., Judge.)*

OLDHAM *v.* THE CORPORATION OF LEAMINGTON

This was an action brought by Mr. John Oldham, the contractor for supplying filtered water to the borough, in which he claimed from the Corporation of Leamington the sum of £29 18s. 11d. The particulars of the claim were as follows:—For 389,714 gallons of water supplied by the plaintiff to the borough of Leamington, between the 1st and 31st days of August, 1876 (in excess of 500,000 gallons per day required to be supplied under a certain contract bearing date June 3, 1856, and made between James Oldham and John Oldham on the one part, and the Local Board of Health for the district of Leamington aforesaid on the other part), at 7d. per 1000 gallons, £11 7s. 3½d.; 833,650 gallons of water supplied by the said John Oldham to the Town Council of Leamington, under the same contract (in excess of 500,000 gallons per day) between the 1st and 30th days of June, 1877, at 7d. per 1000 gallons, £24 6s. 3½d.—£35 13s. 7d. Credit cash paid on account of water supplied in excess of 500,000 gallons per day, £5 14s. 8d. Balance due, £29 18s. 11½d.

Mr. YOUNG, who appeared for the plaintiff, said the action was simply for goods sold and delivered, and with the exception that the defendants were the Corporation of Leamington, and the goods sold and delivered were large quantities of water, he did not think the case was one of more than ordinary importance. The facts were simply these—that so long ago as the year 1856 Mr. Oldham and his brother, who were then in partnership together, entered into a contract with the Local Board of Leamington (whose successors the Leamington Corporation now were) to supply that body with water; and Mr. Oldham was to construct proper filtering-beds and everything requisite, such as pumping machinery and the like, for taking the water from the river Leam, and, after it had been purified, supplying it to the corporation for distribution over the town, for drinking and other purposes. Immediately after the contract was signed, Mr. Oldham at once proceeded to construct the necessary works; and as soon as they were completed he was to commence supplying the corporation with water. He was thus put to a considerable expense in purchasing machinery and erecting the works. The third clause of the contract provided that the plaintiff should construct works to filter water, and pumps and engines to raise it to the town reservoirs on the Newbold Hills, 154 feet above the level of the weir at the Leamington mill head; and such quantities of water were to be supplied from time to time as ordered, but not exceeding in the whole in any one day the quantity of 500,000 gallons. He directed special attention to this provision, because the question in dispute was the quantity of water to be supplied, and Mr. Oldham was suing for payment of that in excess of 500,000 gallons, supplied on the dates named in the particulars. A modification in the size of two reservoirs, to be provided by the borough, from 5 million to 500,000 gallons each was agreed to, and that had contributed largely to the difficulties which had arisen. The 11th clause of the contract stipulated that plaintiff was to supply so much filtered water as the local board might demand and require, not exceeding 500,000 gallons per day, but defendants were,

at the commencement of each calendar month, to give to plaintiff a written notice, signed by the clerk or surveyer, stating the maximum quantity of water that would be required during the next ensuing month. Clause 25 fixed the price to be paid for the water supplied, which was for the first 200,000 gallons at the rate of 2½d. per 1000 gallons per day, upon the average of twelve months; for any additional supply up to an additional 100,000 gallons, at the rate of 1½d. for each 1000 gallons per day upon such average; for any additional supply above 300,000 gallons up to an additional 100,000 gallons, at the rate of 1¼d. for each 1000 gallons per day upon such average; and for any additional supply beyond 400,000 gallons, after the rate of 1¼d. for each 1000 gallons per day upon such average. Defendants seemed to think that they could require plaintiff to supply any quantity of water they might want in excess of 400,000 gallons per day, at the rate of 1¼d. per 1000 gallons, but plaintiff contended that he was not bound to supply more than 500,000 gallons in any one day at that rate, and that for any quantity beyond the last named he was to be paid specially. Matters went on under the contract until July 19, 1876, when plaintiff wrote to the then Mayor of Leamington, reminding him that on Jan. 18, 1874, he had written to the chairman of the local board, requiring that notice of the quantity of water to be supplied during each ensuing month should be given, according to the 11th clause of the contract, but that his request was disregarded. He asked his worship to direct that the clerk or surveyor should, in pursuance of this provision, give him notice of the maximum quantity of water required for each month; and he added, "from this time I shall require to be paid after the rate of 7d. for every 1000 gallons of water supplied by me to the town in excess of the 500,000 gallons per day, being the extent of my contract." Having had to construct the works to meet the extra demands of the town, the plaintiff was entitled to be compensated for the necessary outlay, and was at liberty to charge, for the water supplied in excess of the maximum quantity named in his contract, such price as he thought proper.

The JUDGE said that it would be a question of contract between the parties as to what price should be paid for any quantity of water supplied beyond the maximum stated in the agreement. Because the plaintiff had done so, it did not at all follow that he was entitled to charge any sum he thought proper to ask.

Mr. YOUNG said his contention would be that the charge of 7d. per 1000 gallons had been agreed to between the parties.

Mr. BUSZARD, Q.C., who appeared for the Corporation, asked whether the learned counsel was prepared to prove such an agreement.

Mr. YOUNG said there was an implied contract, which was as binding as a written agreement, or even a contract under seal. Mr. Oldham gave distinct notice to the mayor that, after July, 1876, he should require to be paid 7d. per 1000 gallons for water supplied in excess of the 500,000 gallons per day, stipulated in his contract.

The JUDGE asked whether it could be contended that the mere assent of the mayor would bind the Corporation.

Mr. YOUNG thought it would. At all events, he was prepared to argue the point, if it was raised on the other side.

The JUDGE said he should hear what Mr. Buszard had to say upon it.

Mr. YOUNG said that on Aug. 30, 1876, after the maximum quantity of 500,000 gallons per day had been supplied, a request was made to the plaintiff to furnish an additional quantity. Plaintiff wrote to the town-clerk, acquainting him that the maximum quantity ordered for that month, 500,000 gallons per day, had been supplied, and that the quantity had been exceeded, and he should require to be paid for such excess at the rate of 7d. per 1000 gallons. In the course of the same day, plaintiff received an urgent message from the then mayor, Alderman Wackrill, to the effect that the town was without water, and that it would be necessary for the second reservoir, which was empty, to be at once filled. Plaintiff accordingly turned the water on, and supplied the quantity now claimed for by him. No more water was required over and above the 500,000 gallons a day until the 31st of May in the present year, when the plaintiff received an order to supply, during the month of June, at the rate of 600,000 gallons per day—that being 100,000 gallons in excess of his contract. Mr. Oldham wrote a letter to the surveyor on the same day, calling his attention to the maximum fixed in the contract, and stating that he was quite prepared to supply 600,000 gallons per day, at the price mentioned in his letters of the 19th of July and 30th of August, 1876. In reply, he received a letter, dated June 9, from the borough surveyor, informing him that the water would be paid for as hitherto—strictly on the terms of the contract. No exception was taken to plaintiff's price for the extra quantity beyond his contract, and, therefore, he submitted that, in regard to both items in plaintiff's claim, though defendants had not distinctly agreed to pay plaintiff the price he charged, they had done what raised an implied agreement—they had taken and used the water supplied, but now declined to pay for it. If the Court thought there was not an implied agreement to pay the plaintiff's price for the extra water supplied in August, 1876, there certainly must be in June of the present year. During the month of June there were supplied to the town an excess of 833,650 gallons. The consequence of the plaintiff having to supply a larger quantity of water was that he was obliged to enlarge his works. At the end of the month of June, Mr. Oldham sent in his account; and the Corporation gave him a cheque, but not for the full amount of 7d. per 1000 gallons—thus allowing him only for the excess at the rate of 1½d. per 1000. Of course the plaintiff repudiated the cheque, sent in full discharge of his account, and intimated that if the corporation did not require his supply of water at his own price they should not have it at all When plaintiff sent in his account for the water supplied, the town council only paid for the extra quantity beyond the 500,000 gallons per day, mentioned in the contract, at the rate of 1½d per 1000 gallons. In August last defendants ordered 650,000 gallons per day, when plaintiff stated that his contract was an unremunerative one, and he could not supply any extra quantity, unless the council would pay him the price he had named, of 7d. per 1000 gallons. The two questions that would arise would be—the power of the corporation to contract except under seal; and, secondly, as to the reasonableness of plaintiff's charge, if the Court should think there was no agreement, expressed or implied, for the corporation to pay the plaintiff 7d. per 1000 gallons for all water supplied beyond the maximum 500,000 gallons per day stipulated in his contract. With reference to the reasonableness of the charge made by the plaintiff, he might state that there was hardly a town in England where water was supplied at a less rate than 7d. per 1000 gallons. In most towns the cost was considerably higher—at Warick it was 8d., and the Leamington Corporation charged the neighbouring parishes of Lillington and Milverton 9d. and 1s. per 1000 gallons for the very water they had from Mr. Oldham.

The JUDGE asked whether it was proposed to leave it to him to say whether 7d. was a reasonable price per 1000 gallons? That was a question which he thought very much more within the province of an engineer. Certainly a County Court was the very worst tribunal in the world to settle such a point.

Mr. BUSZARD said the two items in dispute were really too trivial to refer to arbitration, inasmuch as, as a matter of fact, the contractor had since refused to supply more than 500,000 gallons.

Mr. YOUNG said there was a distinct agreement that the corporation should pay 7d. per 1000 gallons for the excess. The plaintiff was not obliged to supply more than 500,000 gallons; but if he did so he was entitled to a fair sum for it.

The JUDGE referred to the letter of the 8th of June, which he thought was a repudiation of the terms proposed, seeing that the surveyor distinctly stated that the corporation would pay Mr. Oldham for the excess, at the rate hitherto paid—a penny and one-eighth per 1000 gallons.

Mr. YOUNG said that after that intimation he should abandon the first part of his claim and rely on the second, which related to the supply of an extra quantity of water at the express request of the then mayor, after the clerk had been informed that the price would be 7d. per 1000 gallons. He maintained that the water was ordered by the mayor, was accepted with a knowledge of what the price was to be, and that this was as clear a case of accepting terms named by the plaintiff as possibly could occur.

Plaintiff was then called, and deposed that on Aug. 31, 1876, the supply of water which had been ordered, to the extent of 500,000 gallons per day, was exhausted. On the 30th, he wrote to the town-clerk, stating the contract maximum had been exceeded, and that, for the extra quantity, he should expect to be paid 7d. per 1000 gallons. The next day, whilst at the reservoirs, he received a message by the foreman of the water-works, bringing the mayor's complaints to him, and asking him to turn on the water. He accordingly did so, and an excess of 389,714 gallons was supplied.

Cross-examined by Mr. BUSZARD: There was never any express agreement by the corporation to pay 7d. per 1000 gallons for the quantity supplied in excess.

Alderman *Wackrill* said in 1876 he was Mayor of Leamington. On the night of the 30th and on the morning of the 31st of August, he gave orders to the foreman of the water-works to limit the supply of water, as the reservoirs were low, and also instructions that one of the reservoirs should be kept full, so that there might be a supply on the 31st. At the time he sent the message, one of the reservoirs was quite empty. He, therefore, despatched the foreman to the plaintiff, requesting that the empty reservoir should be filled by the next day, and that the other should be turned on at once. He was sure that nothing was said as to the price to be paid for the excess. There had never been any agreement made, either by himself or the corporation, that the plaintiff should receive 7d. per 1000 gallons for the excess supplied.

Mr. BUSZARD, in addressing the Court for the corporation, submitted that no evidence had been given of the existence of an agreement to pay 7d. per 1000 gallons, for all the water used beyond the half a million gallons named in the contract. He said that even between private individuals there would have been no binding contract, and in the case of a corporation, a contract on such an important matter would only have been binding under their common corporate seal. The mere verbal order of the mayor, or the order of the surveyor, could not possibly constitute a contract binding upon the corporation. If plaintiff desired any new contract to be entered into, to meet the increased requirements of the town, it should have been executed in the regular way. The question really was, not whether plaintiff was to be paid at all, but whether he was to be paid his own price of 7d. per 1000 gallons for extra water supplied. The corporation had paid 1¼d., the price fixed for the quantity over 400,000 up to 500,000 gallons, and as the price decreased gradually from 200,000 gallons as the quantity increased, he thought the learned judge would say that the spirit of the contract had been fully carried out. Plaintiff had all the requisite plant, and it only required a little extra labour on his part to supply the extra quantity; therefore it was only reasonable that the price should gradually diminish with the increased consumption. If plaintiff had only been paid at the rate of 1d. per 1000 gallons for the extra quantity, he argued that he would even then have had great difficulty in maintaining an action to recover anything more. The quantity of water consumed was not to be calculated upon the quantity supplied *de die in diem*, but on the daily average throughout the year. The 25th clause of the contract clearly showed that that was so, because, though it provided for half-yearly payments being made to plaintiff on the quantity consumed during the half year, the amount was to be increased or diminished according to the daily average at the close of the year. Taking this basis, plaintiff was not entitled to anything, because in neither of the years embraced in his claim had the annual daily average been in excess of 500,000 gallons per day. Admitting that, on Aug. 31, he supplied for that month the extra 389,714 gallons charged for on that day, when divided by 365 days it would only increase the annual daily average to 466,000 gallons. Therefore, instead of having paid plaintiff too little, by paying him 1¼d. per 1000 gallons for these extra 389,000 gallons, the corporation had paid what they need not have paid at all.

Mr. YOUNG said he strongly objected to the daily average of 500,000 gallons being calculated upon the aggregate consumption of the year.

The JUDGE said this was the mode in which to calculate payment when the water had been supplied, but that, if ever called upon, on any one day, to supply more than the maximum agreed quantity of 500,000 gallons, the plaintiff should either have refused to do so, as he had a perfect right to do, or he should have made an express bargain as to what he was to be paid for any quantity of water supplied or any one day in excess of his contract.

Mr. YOUNG said if the question arose as to what was a fair price for the plaintiff to be paid for the extra water supplied, he had a scientific witness in attendance who could be examined on the point.

The JUDGE said it would be rather a difficult point for him to determine, but he did not think it would arise. It would be very uphill work to convince him that for a quantity above 500,000 gallons per day 7d. per 1000 should be paid, when from 200,000 gallons, the price for which was but 2 5-16d., the price gradually decreased for the increased quantity supplied.

Mr. YOUNG said that, since the contract was made, the cost of coal, wages, and other expenses had increased, and if the plaintiff had made an unremunerative contract, surely he was not to be compelled to supply water in excess of it, unless he were paid a fair price for so doing.

The JUDGE, in deciding the case, said the question at issue between the parties arose out of a long contract which was before him, the whole of which had not been gone into. By Article 3 of the contract, which was made between the board of health and the plaintiff, it appeared that the latter had to provide buildings and pumping-engines, for the purpose of supplying such a quantity of water as the board of health might from time to time require, but not exceeding in one day 500,000 gallons. He had no doubt whatever upon the contract that there was no obligation on the part of the plaintiff to supply in any one day a greater quantity of water than 500,000 gallons. Therefore, the question he had to determine was—whether, it being admitted that on the 31st of August, 1876, the plaintiff did supply a greater quantity than 500,000 gallons, there was any contract which would bind the corporation to pay him at the rate of 7d. per 1000 gallons. He could not agree with Mr. Young that this extra quantity had been supplied under the contract of 1856, because the maximum under it was limited to 500,000 gallons in any one day. It, therefore, must be the subject of some other contract between the parties. He did not think, from the facts which had been stated, that there was any contract on the part of the Mayor even—he preferred to put it in that way—to pay 7d. per 1000 gallons for the extra water supplied on Aug. 31, 1876. To the plaintiff's letter of July 19, 1876, merely stating that he should require to be paid 7d. per 1000

gallons for any water supplied beyond 500,000 gallons per day, there did not appear to have been any answer returned, except the notice of the surveyor, that 500,000 gallons per day be supplied during the ensuing month of August. That could not be construed into an acceptance of the plaintiff's charge of 7d. per 1000 gallons for any quantity supplied in excess of 500,000 gallons per day. It was true there was no express repudiation of it, but the order, being limited to the maximum quantity under the contract, indicated the intention of the corporation not then, at all events, to accept any further supply whatever, either at 7d. per 1000 gallons, or at any other price. He therefore held, with respect to that part of the claim, that there was no contract on the 31st of August binding upon the corporation to pay 7d. per 1000 gallons for any water supplied in excess of the maximum quantity of the plaintiff's contract. Having come to such a conclusion on that point, *à fortiori* there was no contract with respect to the second item. The only evidence was the note written by plaintiff on May 31, 1877, and on the 8th of June the reply to it was the letter of the borough surveyor: "I am instructed by the Water-Works Committee to say that the water supply will be paid for, as hitherto, strictly in accordance with the terms of the contract." What did the defendants mean by that? He could not read it in any other way except that they intended to pay, as they had previously done, 1½d. per 1000 gallons. That must have also been clear to plaintiff; it could not possibly have been interpreted by him into an agreement to pay, for an extra quantity of water, the price that he had demanded. Plaintiff had previously been satisfied with 1½d. per 1000 gallons extra per day; and as he had not adduced any evidence to show that that rate was unreasonable, his verdict must be for the defendants.

Judgment was therefore entered for defendants, with costs.

Miscellaneous News.

METROPOLIS WATER SUPPLY.

METROPOLITAN BOARD OF WORKS.

A Special Meeting of the Board, convened pursuant to a requisition signed by five members, was held at the Offices, Spring Gardens, on Friday last—Sir J. HOGG, M.P., in the chair—to consider the following notice of motion by Mr. Fowler:—"That so much of the resolutions of the Board of the 14th instant as approve the recommendation of the Works and General Purposes Committee for obtaining a new supply of water for potable, fire-extinguishing, and other purposes, and direct that a Bill shall be introduced into Parliament next session for carrying the same into effect, be rescinded."

The CLERK read the requisition.

Mr. FOWLER presented the following resolution, which had been adopted by the Vestry of Lambeth:—"That, having heard Mr. Fowler's statement as to the proposed action of the Metropolitan Board of Works with reference to the water supply of the Metropolis, and his action in the matter, the vestry desire to express their approval of his opposition to the scheme."

The communication was ordered to be entered.

The CHAIRMAN said he found that a misapprehension had gone abroad that the new water scheme, for which the Board had resolved to go to Parliament, had been designed by Messrs. Bramwell and Easton, and simply approved by Sir Joseph Bazalgette on behalf of the Board. It was due to the Board and to Sir Joseph, that he (the chairman) should correct this misapprehension. The scheme had been prepared by Sir Joseph Bazalgette and Messrs. Bramwell and Easton conjointly, and the parliamentary plans were being prepared in the office of the Board.

Mr. FOWLER, in submitting his motion, said he wished, at the outset, to remove any misapprehension on the part of honourable members, that in taking the step he had taken he had any intention to weaken or damage the resolution the Board originally came to with reference to the purchase of the undertakings of the water companies, and vesting the supply of water to the Metropolis in the hands of the Board. His motion was simply directed to that portion of the scheme adopted on the 14th inst., which proposed to give a double supply of water to the inhabitants, and the reason why he no wasked the Board to rescind that resolution was that he, and those who agreed with him, believed that no sufficient opportunity had been given for the due consideration of so important a question. This was a matter which, in its entirety, involved the expenditure of many millions of the ratepayers money; and surely, in such a case, the fullest opportunity ought to be allowed, both in the Board and elsewhere, for a discussion of the scheme in all its details, before a final decision was come to. It was usual, when questions of this sort, affecting such large interests, were to be determined, to discuss the subject at an ordinary meeting, when the members had made their arrangements to be present, and not at a special meeting, when professional and other engagements prevented many from being in their places at the Board. It had been said ironically in reference to himself, that on the occasion when the resolution for prosecuting the second Bill was come to, he had fired a shot and then run away; the truth being that, although he was present and raised his voice against the scheme, he was not able to remain till the vote upon it was taken. The majority in favour of that scheme was a very small one, there being only two-thirds of the members of the Board in attendance, and the certainly unusual, though he did not say improper, course being taken by the chairman of giving a personal vote in the matter. He (Mr. Fowler) did not intend again to go over the arguments against the scheme, thinking that the remarks he had already made sufficiently justified the course he had taken in giving notice to rescind a resolution, come to, as he believed, without that full consideration which the importance of the interests involved certainly demanded.

Mr. MUNRO seconded the motion, stating that he cordially approved of the remarks made by the mover as to the desirability of the purchase of the undertakings of the water companies. He regretted that, at the special meeting, the mover of the report of the committee did not see his way clear to divide his resolution, so as to give those who approved of the first proposition the opportunity of voting for it, without being committed to the second portion, which related to the scheme of the engineers for a double supply. He felt also that a question of so much importance as the water supply of the Metropolis, involving, as it did, a prospective outlay of 25 or 30 millions of money, ought to have been discussed in a fuller Board before a decision was arrived at. A meeting of only thirty members, or less than two-thirds of the whole number, ought not to take the responsibility of deciding whether or not such a gigantic scheme should be carried out. He complained of the sudden and hasty manner in which the second portion of the committee's report was brought forward. The report of the three engineers, to which it committed the Board, was sent out on the 10th of August; it had never been discussed by this Board, and it was sent to the vestries and district boards without a remark of any kind being appended to it. On the last occasion Mr. Roche said that no vestry or district board had objected to the scheme.

Mr. ROCHE said his statement was that this Board had received no objections from them.

Mr. MUNRO said the question was raised at the Whitechapel Board, and had it not been that he asked them not to express an opinion until the Metropolitan Board had discussed the matter, there would have been an unanimous resolution adopted against the scheme. No doubt it was the same elsewhere, and therefore it was unfair to say that no vestry or district board had objected. Referring to the present supply of water, he found, from the report of the Royal Commission, that it was stated to be good and wholesome. That was in 1869, and he was given to understand that great improvements had been effected by the companies since then. If so, why should not the Board content themselves with purchasing the undertakings of the companies, and if they found they were not equal to the requirements of the public, endeavour to make them so, instead of resorting to a scheme for a double supply of water to the Metropolis? He felt strongly that it would be better for them to confine themselves to that which was likely to be agreed to unanimously, or nearly so, and he was persuaded they would find quite enough to do in carrying out the purchase scheme. He complained that in this matter, also, the Board had not pursued the usual course of referring the question to the Parliamentary Committee, but had remitted it to a small committee, appointed some ten months ago. There were other objections which he might state, but he justified his support of the present motion mainly on the fact that when the report of the committee was adopted, many members were absent who ought to have had the opportunity of expressing their opinions upon it.

Mr. FELL said unless some very much better reasons could be given, for rescinding the resolution of the special meeting, than had been given by the mover and seconder, it was not his intention to recall the vote he gave on that occasion. With regard to the question of the second supply of water, it had now been before the public for some months, and surely if there had been any defect or deficiency in the scheme, or anything wrong in the calculations of the eminent engineers who prepared it, the Board would have heard something of them before now. Had the water companies themselves been living in a kind of fool's paradise, and not troubling themselves about the subject? He was sure the majority of the members of the Board did not hold that view, but were convinced that the companies would have found some one able and willing to enter the lists against the projectors of the scheme, if their calculations were fallacious, and not to be depended upon. With reference to the vestries, he agreed with Mr. Roche that the members of the Board ought not to consider themselves "mere delegates of the vestries." He did not feel himself to be so, and hoped he never should, though it might be very convenient for those members who did not want to support a proposal to say, "My vestry has given no opinion upon it." Objection had been taken to the report of the engineers that it had been read before the British Association before being discussed by the Board. He did not feel that objection, but thought it most reasonable and proper that those who prepared the report should take an opportunity of bringing it before the public, and how could that better be done than by submitting it to a meeting of the British Association? And how was it received by the Association? Captain Douglas Galton, whose opinion, he supposed, on such a question, was worth something, expressed his entire approval of it; Mr. Parke Neville believed it offered the only solution of the difficult question of the future water supply of London. Dr. Farr, Sir James Watson, and Lord Fortescue, the President, all signified their concurrence in the views expressed by the engineers. With respect to the question of expense, he (Mr. Fell) was very much inclined to think that if there had been any objection to the scheme on that score the Board would have heard of it before now. The engineers said that their plan could be carried out at a great saving of expense to the inhabitants of London, in comparison with the necessary cost of enlarging existing works. Not a word had been said at the Board on that question. As to the alleged haste in deciding upon the scheme, it was all very well to say that the Board had not considered it. The Board had been considering it for months past, and he believed that if they intended to give a supply of good and wholesome water to the inhabitants of London, they had better adhere to the resolution adopted at the special meeting.

Mr. RICHARDSON remarked that it was a fact worth bearing in mind that they had now arrived at the twenty-second year of their history as a Board. He had been a member about sixteen or seventeen years, and during that period he had seen the Board progressing and advancing in the confidence of the public, of the Legislature, and of the Ministers of the Crown for the time being. He regretted, therefore, that it was reserved for its twenty-second year, when it might be considered to be in full manly vigour, to be asked for the first time, by a number of its members, to do an act which would degrade the Board in public estimation, by showing that it was a vacillating body, having no confidence in its own powers, and not knowing its own mind from week to week. It would be impossible for a Board like that to hold up its head again. (Laughter.) He considered that this was an attack made upon the Board's reputation —(oh! oh!)—a very severe attack indeed, and he trusted it would fail, for the Board's own sake. But he thought they could scarcely realize the consequences of this attack upon the Board's reputation until they considered the circumstances which surrounded it. The first thing to be borne in mind was that, though each member formed an integral part, the Board itself was a unit; it came to its resolutions as a unit, and it must be as a unit that any resolution adopted by it was rescinded. He asked whether it would be wise, whether it would be supporting the position of the Board in the eyes of the public, if, on that occasion, it rescinded as a unit that which as a unit it approved ten days previously. Then, again, he asked the Board to consider this point. It had been said that the members had not had time to consider the scheme for the additional supply of water. Now, as a matter of fact, this question was referred to the Works and General Purposes Committee, which was a committee of the whole Board, so far back as February last. In March the propriety of purchasing the undertakings of the water companies came up before the Board itself, and the proposal was almost unanimously approved of. Again, in March, there was a report from the engineer asking to be allowed the assistance of two eminent engineers, as he felt the difficulty of the position in which he was placed in dealing with the question referred to him, knowing as he did that the mere purchase of the water companies would not meet the requirements of the Board. The Board approved of Sir Joseph Bazalgette's suggestion, and instructed him to employ Mr. Bramwell and Mr. Easton. These gentlemen reported to a committee of the whole Board; that report was brought up and ordered to be printed, and it had been a public document since the month of July last. Since then the Works Committee had again considered the matter, and on the recommendation of a sub-committee, passed a resolution specially approving of the report of the engineers, and instructing the sub-committee to go on and prepare a Bill. Last of all, the committee ten days ago brought up a full report of their own upon it, which the Board approved, and ordered the necessary notices to issue thereon. And yet the mover of the present motion asserted that the Board knew nothing about it. To ask the Board now to rescind the resolution already come to would be to lower its character, and show that it was unworthy of public confidence. (Oh! oh!) He could not help directing attention to the somewhat unusual course taken by the mover in calling this special meeting. The usual course was to ask the chairman to call a special meeting. Why was that not done in this instance, instead of its being called on a requisition signed by six mem-

bers? He supposed it was because it was known that the chairman would disapprove of such a course—("Hear, hear," and laughter)—and that the chairman would feel the interests of the Board were at stake in the matter. (Interruption.) But, after all, what was the decision to which the Board had come? Simply that notices should be issued of an intention to apply to Parliament—the arbiter of the nation—to consider the question. And now the Board were asked to rescind their resolution, and thus declare that they would not ask the opinion of Parliament whether this was a good scheme or not. Was Mr. Fowler afraid to go to Parliament? The Board had already affirmed on several occasions the necessity for taking steps in the matter, and all the resolution of the special meeting on the 14th inst. affirmed was the desirability of Parliament being asked to settle the question. The proposal now made was a direct attack upon the reputation of the Board—(oh! oh!)—an attack made from within—an attack made by gentlemen, two, at least, of whom had been honoured by the Board, by being placed in the highest positions the Board could offer. And why so placed? Because the Board considered that its honour was safe in their hands. He ventured to think that neither the honour nor the dignity of the Board was safe in such keeping. (Laughter.) He did not think he could speak too strongly in thus expressing his opinion, and urging the Board to refuse to sanction the motion now before it. (Ironical cheers.)

Mr. CUFFLIN said the member who had just spoken had made some most extraordinary statements; but for himself he ventured to think that it was neither wise nor well to talk of going to Parliament with a project of so extensive a character as the one that had been sanctioned, when it was evident that a large number of members of the Board were opposed to it. If it should turn out that day that a majority of the Board agreed with him, by all means let them stay their hands at once. Mr. Richardson complained that the honourable member for Lambeth did not ask the chairman to call a special meeting for rescinding the resolution already come to. But surely Mr. Fowler would have been exceedingly foolish, and would have shown very bad taste, if he had made any such request, knowing, as he did, that the chairman was strongly in favour of the proposition. Like a good many others, Mr. Richardson was very ready to find fault with those who happened to differ with him, and to think that they possessed extremely narrow and contracted notions, as compared with his own enlarged and comprehensive ideas. (Laughter.) Mr. Richardson was not at all singular in this respect. Those who opposed this second scheme were charged with a desire to obstruct the Bill for the purchase of the companies. But he (Mr. Cufflin) would unhesitatingly assert that there were not half-a-dozen members of the Board who would oppose that Bill. For himself, he had advocated the transfer of the water supply from the hands of the companies to those of a municipality, and the provision of an unlimited supply of pure water to the Metropolis, years before Mr. Richardson was born. ("Hear, hear," and laughter.) But because he was in favour of the first portion of the committee's report, that was no reason why he should advocate the second. He strongly objected to the member for Greenwich taunting those who ventured to differ from him with being vestry delegates. For himself, he had never known a single member decline to vote at the Board on the ground that he must first ascertain the opinion of his vestry. Even had it been so, he questioned whether there would be anything discreditable in a member desiring to know what his constituents thought on a great public question, involving the outlay of a considerable sum of the ratepayers money. Members of Parliament were not above asking the opinions of their constituents, when great interests were at stake. As to the scheme now under the consideration of the Board, one strong objection to it was, that it had been hurriedly pushed forward before any one had heard sufficient about it. It was very well to say the report of the engineers was sent out three months ago, but it must be borne in mind that at that time the Board carefully abstained from endorsing it, and stated distinctly that it must be taken by the public simply as the report of the engineers themselves. He did not say that the scheme itself was objectionable, only that the decision upon it was too hurried, and he believed the engineer of the Board, the solicitor, and the parliamentary agent were not satisfied with the consideration that had been given to it, and would be glad if more time were allowed for that purpose. He recommended that the Board should go for the purchase of the companies, and his opinion was that when they got the supply into their own hands, they would not care much about carrying out the second scheme. It was rather a serious question, that of permeating the whole of the Metropolis with a second set of water-pipes, and entering every house for the purpose of furnishing a duplicate supply, and therefore the greatest consideration should be given to such a proposal before it was adopted.

Mr. LLOYD said he was not present when the resolution was come to, but he had read the report of the proceedings, and entirely agreed in the propriety of the resolution adopted by the Board. He hoped the Board would adhere to their decision.

Mr. COOK said he sympathized with the feelings of the gentlemen who signed the requisition, and he certainly did not sympathize with the strong language employed by Mr. Richardson on this occasion. The course pursued by the special sub-committee on the water question had been so unusual as to create a great deal of ill-feeling, and he certainly considered that those who, on the 14th inst., would have voted against the second proposal, if they had been present, had a real and substantial grievance. That a special meeting should be called on an off day when it was not expected—a meeting of busy men who had other engagements—to consider so important a question as this, was, he thought, a grievance to those who were not able to attend. He thought also it could not be denied that the scheme of the three engineers had never been discussed by the Board. It was true copies had been sent to all the members; but, like members of the House of Commons, they were pretty well deluged with papers, and did not read the half of those which came into their hands. Moreover, it was one thing to have a scheme laid before one in print, and another to hear that scheme discussed by men capable of explaining its details, and forming a judgment upon its merits. This Board, he asserted, had never had the opportunity of forming an opinion on the scheme of the three engineers, and, such being the case, he again said that he sympathized rather strongly with Mr. Fowler and the gentlemen who signed the requisition. But here his sympathy was at an end. He felt that the Board, having taken a public step as a body—not exactly a municipal body, but one very like it—having resolved upon a certain course, and having issued advertisements announcing their intention, which had been commented on by every journal in London, and many in the country, the members ought to sink their individual differences of opinion, and unite to carry out the scheme resolved upon. He thought that, had he been present at the meeting on the 14th inst., it was quite possible he should have supported the amendment by Mr. Runtz, as the report of the committee was rather larger than he could take down at one gulp. He was not at that meeting; but there was no reason why, on that account, the Board having come to a determination upon it, he should now do anything that would injure the Board in public estimation. Whatever blame he might attach to individual members for the course then taken, he should not blame them before the public; but he would endeavour in future to prevent them from serving him the same trick again. If the members quarrelled amongst themselves, do not let them quarrel before the public. Mr. Fowler, in his remarks, said he did not wish to stultify the Board. He would give the honourable member credit for that, but, unfortunately, people often did that which they had no intention of doing. He was sure that, if Mr. Fowler's motion was carried that day, it would inflict a very severe blow on the honour of the Board—not intentionally, but it must have that effect—and, therefore, while desiring to avoid the use of strong language in imitation of Mr. Richardson, he would earnestly ask the Board to consider how the matter would be looked at by the public. And he besought the members, whatever they did, to avoid ill-feeling and strong language. They were met on an important occasion, and they ought to possess the calmest state of mind. Now, supposing they did not rescind the resolution adopted on the 14th, how would they be damaged? They all professed an honest wish that the supply of water to the Metropolis should be in the hands of the Board, so that the only difference between them was as to the adoption of the scheme of the three engineers. And the objection to that was not as to its design and intention — namely, to supply a good potable water to the inhabitants of the Metropolis. The objection was entirely as to the details of the scheme. Some one had stated that the water companies had improved the quality of their supply; but it must be remembered that the city of Oxford still drained into the Thames, and that several towns, including the large town of Luton, in Bedfordshire, still drained into the Lea, from whence the New River and East London Water Companies derived a portion of their supplies. It could not be denied that the present sources of supply were objectionable. It was not pleasant to think that, in London, the inhabitants were drinking water polluted by sewage, and, as members of the Board, they must all desire, in the interests of their constituents, that this state of things should come to an end as soon as possible. Being all agreed, therefore, in the main design of the scheme of the engineers, would it not be better to leave the question of details to a committee of the House of Commons? It had been suggested that the water companies would bring their influence to bear upon the members of the Board. That they would do so upon the House of Commons it was well known from painful experience. It was one of the great calamities of this country to be company ridden; but he did hope that any members who were connected in any way with the water companies would show by their votes on the present occasion, that they could and would act independently of such interests.

Mr. THOMPSON said he thought nothing could have been more unfortunate than the suggestion that members of the Board might be influenced by a regard to their own interests. Mr. Richardson made a great mistake when he charged those who signed the requisition with having voted against the purchase of the water companies. The issue raised by the motion now before the Board was distinct, and related not to a rescinding of the resolution to purchase the companies, but only to "so much of the resolutions of the Board of the 14th inst. as approved the recommendation of the Works and General Purposes Committee for obtaining a new supply of water for potable, fire-extinguishing, and other purposes." Those who desired that this resolution should be rescinded did not vote against the compulsory purchase of the companies, nor against the proposal to give the inhabitants of London a plentiful supply of pure water. For his own part, he maintained that there was enough pure water already brought into the Metropolis by the New River and East London Water Companies for potable purposes, and that if the Board had the control of the supply they could, at a small expense, distribute that water all over London, and save the cost of introducing this new scheme. What did *The Times* say in reference to this question a week ago? "Whether the present proposal be a wise one or not is a wholly distinct question, and it will, we may be sure, be most strictly investigated by the parliamentary committees before whom the contemplated Bill will come." And again: "It would seem, at first glance, a somewhat extravagant plan to employ the purest water we can obtain, for such a purpose as the extinction of fire." And speaking of the Board, it said: "Their object is admirable, but whether the means they now propose are satisfactory, is a question on which opinion must be held entirely in reserve." And yet it was now suggested that, because some members of the Board asked for further time to form an opinion on such a momentous question, they were opposing the truest interests of the inhabitants of the Metropolis, and thwarting the best intentions of the Board. How long had the generality of members been possessed of information as to the intention of the sub-committee to apply to Parliament for this extravagant scheme? Mr. Richardson said the report of the engineers had been a public document since July, but Mr. Cufflin very properly added that it was circulated as a report without any sanction of its proposals by the Board. In fact, it was only on the 5th of the present month that Sir W. Codrington moved that the sub-committee should be called upon to bring up their report on the subject, and it was not until the 12th inst. that, in committee, the members of the Board first had the recommendations before them. It was not right, therefore, to say that this matter had been under consideration for months; it had only been known for two days before the special meeting was held, at which it was adopted. Surely, then, it was too bad that, under such circumstances, if a member asked for further time to consider it, and, that the vestries might have it brought under their notice, he should be twitted, as they were, by the deputy-chairman, with being "vestry delegates." He begged to tell Mr. Roche that he had been a member of the Board twelve years, and he had never once taken directions from his vestry how to act, and he was sure his vestry would never insult him by requiring that he should do so. He held, as he had stated, that there was plenty of pure water obtainable in London for the supply, not only of the present, but of a much increased population, and he did not believe that the large and expensive scheme of the engineers for a second supply would ever pay or yield results commensurate with the outlay. The course the Board should take was first to get possession of the undertakings of the companies, and for that he voted. Such a proposition had been under the consideration of the Board for years, but the other had only been before them for days, and he was not disposed to give his vote for it, believing that the truest interests of the Metropolis would not be served thereby.

Mr. ROOKE thought Mr. Richardson made an unfortunate allusion to the circular sent round to the members by Mr. Fowler, seeing that he himself adopted a similar course to secure an attendance at the special meeting. ("Hear, hear," and a laugh.) As to the insinuation of Mr. Roche, that those who asked for further time to consider the matter were "vestry delegates," he would remind the deputy-chairman that when the engineer's report was brought up, he himself proposed that they should separate without expressing any opinion upon it, so that the vestries and district boards and the Corporation might have an opportunity of expressing their views upon it before this Board again met. So far as he (Mr. Rooke) was concerned, he did bring it before his vestry, and it was referred by them to the Parliamentary Committee, who flung it on one side, and said, "We will not express an opinion upon it, until we see whether the Metropolitan Board are so insane as, by a majority, to recommend that this scheme be carried out." On bringing up the report of the committee at the special meeting of the Board, Mr. Roche dwelt on the necessity of a constant supply of water to the Metropolis. He (Mr. Rooke) thought to himself, "surely the deputy-chairman has lost sight of the Act of 1871, which lays

an obligation on the companies to give such a supply." He could tell the Board that the parish of Shoreditch would, before the end of this year, have a constant supply at high pressure in every house. Mr. Roche twitted the minority at the Board with not having suggested a better scheme than that proposed by the engineers. He believed that if the question were submitted to three other able engineers, not to provide a separate system, but to utilize and improve the present system, a project could be submitted much more economical in cost, and equal to every emergency. He regretted the position in which the Board were placed by the undue haste in which their decision had been arrived at, and he supported the motion for rescinding the resolution of the special meeting.

Mr. WALKER said the vote on the present occasion would determine who were in favour of clean water and who were in favour of dirty water, and he believed that those who advocated the rescinding of the resolution of the special meeting would never forgive themselves. It might be that, before the scheme to which the Board had agreed was carried out, three-fourths of the members would have passed away, and have no more need of water; but they would have left a legacy of benefits to their successors for all time.

Mr. LEGG said the vestry which he represented were entirely opposed to a dual supply. They believed that the proposed scheme was likely to be a most expensive one, and that, in fact, the whole question was not ripe for settlement. For his own part, he looked upon the proposal to purchase the companies as so large a question that it ought to be initiated by the Government, and not by this Board. He believed the present proposals would fail, as did the Board's schemes for purchasing the gas companies. The action of the Board on the present occasion was very similar to what it was then. They introduced two Bills—one containing a proposal to purchase the undertakings of the companies, the other a bogus Bill—which proposed to "regulate" the companies, if they did not come to some arrangement. Now, they attempted to frighten the water companies by saying, "If you won't sell your undertakings at a reasonable price, we shall take the supply of potable water into our own hands, and shut you out altogether." He was quite sure that Parliament would never assent to such a thing, and allow the Board to become purveyors of water against the private companies, who had a vested interest therein. He complained that the report of the committee had not been fairly put before the Board, and that they had not given sufficient information to show where the great saving was to be effected. During the time that the question of purchase had been under the consideration of the Board, it could not be denied that the companies had materially improved their supply, and had shown a great desire to give a constant service; but the Board had given them no encouragement, and whenever any of the companies had sent them notice of their intention to extend the constant service, the Board had refused to take any action in the matter. If the Board persevered with the Bills they had resolved to promote, they would incur great expense during the next session, and at its close would find themselves just where they now where.

Mr. LAMMIN said the engineers, in proposing so bold a scheme as that set out in their report, should have shown the Board the locality of the hills from which they expected to get their chalk water, and have justified their expectations of a supply by giving the results of borings. He did not believe the work proposed could be effected for five and a half millions, for it did not appear that any surveyors had been asked to estimate the value of the land through which the pipes would have to pass. He warned the Board against "taking a leap in the dark."

Mr. LESLIE remarked that the motion now before the Board was confined to that portion of the resolution of the late special meeting which related to the second supply of water. He had heard that day, with some astonishment, that on the 14th inst. there was a great "whip," by a circular from Mr. Roche, addressed to the members, urging their attendance. (Several members: "We never had one.") However, spite of such a measure on the part of the deputy-chairman, there were only 16 elected members who voted for his proposition; while 13 elected members voted on the other side. The respective rateable values which these members represented were as follows:—The 16 elected members who voted for the dual scheme of water supply represented £9,400,000; the 13 elected members who voted against it represented £9,161,000. But there were 16 elected members absent on that occasion, and they represented £11,264,000. He was not a little surprised at the proceedings of the Board generally on this question, and the conduct of Mr. Richardson and Mr. Lloyd especially filled him with astonishment. Both these gentlemen, in the districts they represented, were receiving water from the chalk—the very thing that they professed a desire to see supplied to all London; and yet they were not content unless the Board purchased the undertakings of the water companies, the cost of which would fall not so much upon their districts as upon the City and the East-end of London. The question then arose, whether in any way their proposition would improve the supply. From the Registrar-General's return, published on the 17th inst., it appeared that, at the present time, 538,021 houses in London were supplied by the water companies. How many of these were supplied from the chalk, by the New River and the East London Companies? The New River Company supplied 126,144 and the East London 113,192, so that nearly half the houses in London were already getting their water from the best source. He himself was a water drinker, and he was supplied by what was called one of the worst companies in London. But the water was so good that he could drink it. Had he any reason to expect that he should be supplied any better supposing the undertakings of the water companies were purchased, and their management transferred into the hands of some gentleman or other who had a fancy that he would be appointed president or vice-president, with a large salary to enable him to live at ease at the expense of the ratepayers of the Metropolis? He believed there had been a very great increase in the supply of water to the Metropolis in the course of the last year. From the Thames alone that increase amounted to about 800,000 gallons a day, and from other sources to about 400,000 gallons. With reference to the report of the committee adopted at the last special meeting, he believed he was right in saying that it was only signed by them on the day that it was submitted to the Board. Moreover, it was prepared outside, and was signed without being read by them.

Mr. WALKER rose to order, and objected to the course which the honourable member was taking.

Mr. WATKINS contended that Mr. Leslie was perfectly entitled to criticize the report and proceedings of the committee if he thought fit.

Mr. LESLIE said they had heard a good deal about bogies, and the bogey got up to frighten the sub-committee into the adoption of their report was this—he was reading an extract from the minutes. This was the advice of the engineers: "Referring to the anticipation expressed in our memorandum of the 3rd of October, we have the strongest reason to believe that the forthcoming *Gazette* of this month will contain a notice by the several water companies of their intention to apply to Parliament for increased powers." Had there been any such notice? He could not find it. But it had the effect of bamboozling such able men as Mr. Walker. (Interruption.) Then the engineers proceeded: "It is evident that the Board must oppose and check any such increase in the capital and works of the companies, unless they are prepared to give up all hopes of becoming the water suppliers of the Metropolis." This was the engineers recommendation: "To succeed in this opposition we are convinced, from our experience of the conduct of Parliament relating to the transfer of trading companies to corporations, it will not suffice for the Board to meet this proposition by a mere project for the compulsory acquisition of the companies property; the only means by which the Legislature can be induced to entertain the question of such compulsory transfer will be that the Board should be before Parliament with a proper scheme for remedying existing defects—a scheme of general application to the whole of the Metropolis." Now, this brought him to remark upon the recommendations of the engineers, and the expense of this particular project. Those gentlemen had stated that it would require some £600,000 for fittings. Taking the number of houses to be fitted as the same as that supplied by the water companies, this estimate gave £1 2s. 3½d. for each house. For this £1 2s. 3½d. each house was to be provided with "an air-tight pressure receiver, holding, according to the size of the house, from two to ten gallons. This receiver will be placed in the basement, and close to the point of inlet of the service-pipe. It will have only one draw-off tap, from which the water will be taken." And, then, as this precious vessel was emptied "for potable purposes," it was to be gradually refilled. And all this was to be had for £1 2s. 3½d. a house! Not a bit of it; nor yet for £5 a house. There were houses in his parish, the basements of which were more than 20 feet from the footway, but they were all to be supplied at this rate. The thing was ridiculous; it was perfectly monstrous and absurd to think that these three gentlemen were to go and involve the Board in such a measure as this. To obtain the necessary supply of pure, potable water, there was to be a pumping-station at Denham, in Buckinghamshire, another at Hayes, in Middlesex, one at Epsom, in Surrey, one at Keston, and another at Eynsford, in Kent, and another at Grays Thurrock, in Essex. Respecting the ownership of the last-named property, he would be prepared at another time, from official documents, to say something. Then there was to be one reservoir at Great Stanmore, a second at Banstead, and a third at Chelsfield. As to the aqueducts, there was to be one from the pumping-station at Denham, passing through various parishes and places till it reached Hanwell, where, perhaps, it ought to stop. (Laughter.) [After referring to other projected works included in the scheme, the honourable member proceeded:] On all these points the Board had received no information, such as would have to be laid before the House of Commons. One extraordinary proposal was "to enable the Board to manufacture and purchase pipes, apparatus, tanks, cisterns, meters, and fittings, and to sell or let the same." The Board were to become pipe-makers, and Heaven knew what besides. Was there ever such a monstrous idea? It was almost too ridiculous to talk about. He appealed to the common sense of the members not to allow the Board to be dragged into a mess, as they were some time ago in reference to the gas question. He protested against the grasping tendencies manifested by many members. They wanted now to be purveyors of water to the Metropolis; the next thing would be the fire insurance business; then the savings banks and the Post Office. There would, he feared, be no limit to this aggressive policy until the Board received an effectual "snub" in the House of Commons.

Mr. ROCHE defended the action of the Board. The course taken by them, in having a special day to consider the question, was in consequence of the necessity by which they were compelled to insert their *Gazette* notices by a certain date. The only reason given by Mr. Fowler for his motion was that they had not had time to consider the Bills. Those Bills were not yet ready, and the Board ought to wait until the sub-committee placed them before them before they condemned them. They could then refuse them if they liked; but they should not stultify themselves and their previous resolution and decline to look at them, which would be the result if the motion before the Board were carried. At present they had only adopted, as a general principle, that they must be prepared to cure existing defects, the details being left until the Bill was ready. They could not possibly carry a purchase Bill in the House of Commons unless they could show how they proposed to cure defects. They had consulted three of the best engineers in the Metropolis, who had advised them that the extension of the existing works, in addition to being more costly than the scheme proposed, would not give so pure a supply of water for the use of the Metropolis as would be afforded by the new scheme. If they allowed the Bill to drop they would be placed in a wrong position before the House of Commons and the public. In the event of the Bill being opposed by the water companies, it would be for the opposition to show the Legislature an alternative for that proposed by the Board, and allow the House of Commons to judge between them. The best course for the Board to take would be simply to negative the resolution now before them, and to calmly consider the Bills when prepared, acting upon them as their best judgment might determine.

Mr. RUNTZ said no one regretted more than he did the present position of the Board on this important question. There was no lukewarmness on the part of any member as to the desirability of affording the inhabitants of the Metropolis with an abundant supply of pure water, and if that were the only point open for consideration, he believed they would be all agreed. They would also, he believed, be agreed on the question who were the parties on whom the responsibility of furnishing such a supply should rest, but they were not agreed as to the method by which it should be done. Now, he took it that the opposition had arisen from a little irregularity in the procedure, which he would point out. At the special meeting on the 14th, when the report of the committee came up for consideration, the preamble of the motion was "that the report of the committee be approved." But the report recommended more than was presented in the resolution, and he then advised the Board to take the question of the purchase of the companies in the first instance, and then proceed to discuss the second proposition, which was the supplementary supply of water. And he asked it for this special reason—that before the vacation the report of the three engineers was printed, and the Board were extremely desirous that the public should not think that the report emanated from, or was endorsed by them. They took special care to let the public know that they had come to no conclusion upon it, and, in fact, had not had it under their consideration at all. And they had never had that scheme before them yet.

Mr. ROCHE: You are trying to prevent it.

Mr. RUNTZ said he hoped he should be able to stop it until there had been an opportunity for considering it. He protested that it was a wrong and a dangerous precedent to adopt such a resolution as was passed at the last special meeting, the preamble of which was "that the report be approved." That report embraced two questions upon one of which only the members were agreed, because it pledged the Board to the whole report, and left no opportunity for discussing the point upon which they differed. They were now told they would have an opportunity for discussion when the Bills came up; but he feared they would be then told that they had already affirmed the proposition in principle. But with respect to the second supply, he believed the water companies would be able to show to Parliament that they already supplied sufficient water from the chalk to answer every purpose. The larger portion of the New River Company's supply came direct from the chalk; the whole of the Kent Company's supply was drawn from the chalk. In his opinion there

was sufficient chalk water now obtained to enable the Board, if they became purveyors of water to the Metropolis, to give an ample supply without establishing new works and constructing expensive reservoirs and pumping-stations, and laying down many miles of mains. He did not admit that the enormous pressure talked about was necessary, but that would be one of the things hereafter to be considered. The engineers insisted upon it to meet the requirements of the Fire Brigade, as though fires were increasing in London, and the present service was no good. The fact was that since the Fire Brigade came into existence great fires in London had diminished in a larger ratio than buildings had increased. The chief need of the Metropolis, with reference to fires, was not water at high pressure, but an amendment of the Building Act passed 40 years ago. Well, then, such being the case, where was the necessity for the proposed extravagant arrangements about hydrants? Suppose they were all erected, as proposed, how many would be used during the lifetime of the present generation? And yet it was proposed, for the purpose of this new scheme, to tear up the pavements on both sides of every thoroughfare, and to invade every house in the Metropolis to introduce a new water-pipe and a small cistern. He would tell them that, before any good could arise from the supplementary supply of water, they would have to alter the habits of householders and of their servants; while if, by the Board supplying potable water, the companies were relieved from the necessity of filtration, there would be more impure water brought into London than ever. These were a few objections; but they had not to discuss these matters now. They had never yet considered them, but were hurrying on this great question without regard to the cost it might involve, or the consequences that would follow.

Mr. SELWAY defended the course adopted by the committee, and expressed a hope that the Board would not stultify itself by rescinding the resolution of the 14th inst.

Mr. FREEMAN said he believed that the question of the future of the water supply of the Metropolis depended upon the vote of that day, and while he was not prepared to endorse the violent language used by Mr. Richardson, he felt that he ought to urge the Board to reject the present motion. He admitted that the Board had had no time to discuss the report of the engineers, and no doubt to some extent that justified the objection now taken by Mr. Fowler; but inasmuch as opportunity would yet be afforded when the Bills came up, he was not disposed, on that account, to rescind the resolution already come to. He suggested that it might be well, in the meantime, to refer the matter to two other engineers —say, Mr. Hawksley and Mr. Bateman.

Mr. SAUNDERS, in an animated speech, supported the motion. He ridiculed the notion of Mr. Richardson, that the opponents of the scheme ought to have asked the chairman to call a special meeting to rescind the resolution of the 14th inst. The very suggestion reminded him of friends on the other side of the Channel. He rejoiced to think that such a state of things did not prevail here, and he hoped it never would. It had been cast at the opponents of the scheme of the engineers that, if they voted for rescinding the resolution of the last special meeting, they would proclaim themselves the advocates of dirty water. In his own defence, he would say that, as representing the City of London, he was in favour of the purest water being supplied to the inhabitants; and as to the question of who should be the purveyors of water to the Metropolis, he believed that years ago the matter should have been in the hands of the authorities. But these were altogether distinct questions from that of whether the Board should, before even discussing the matter, commit themselves to a scheme of borings and artesian wells, and huge reservoirs, and extensive aqueducts all round London, for an independent and supplementary supply of water. Already a fifth or a sixth of the inhabitants were being supplied from the very sources it was proposed to appropriate, and it was absurd to talk of initiating an entirely new system of collection and distribution for the same purpose. But then they were told that, assuming the proposal was not a good one, Parliament would sift it. Were the Board prepared to go to Parliament with a scheme which they did not half believe in themselves? If there was any honour about them, let them submit to the Legislature something that at least they had carefully considered. It was said that when the Bills came up they could discuss and, if necessary, reject them. It was all nonsense. What honour would there be in retreating from their position then? When those Bills came up they would be told that they were already committed to the scheme. He deeply regretted the position of the Board; they ought never to have been so placed, in reference to one of the greatest questions they had ever had before them. But while he said that, he was bound to contend that a scheme brought up at the last moment, involving millions of money, ought not to be put before Parliament until the Board had satisfied themselves that this was the only thing that could be done. They were not in that position. It did not much matter whether or not they rescinded the resolution of the last special meeting, but he remarked that no less than four or five speakers that day had said, in effect, "We are going to vote against the rescinding of it, because the honour of the Board is at stake, but we do not believe in the Bills we are about to promote." These were public men, about to vote for that which would cost millions of money, for the sake of "the honour of the Board," although in doing so they believed they were doing a great wrong! Whether they succeeded in rescinding the resolution or not he did not care, but he looked upon the scheme of the engineers as so unsound that they never would be able to carry it.

Mr. FOWLER having briefly replied,

The CHAIRMAN said before putting the motion, I wish to declare to my colleagues my intention to vote against it.

A show of hands was then taken, when there appeared—

For the motion	20
Against	21
Majority against	1

A division being demanded, there appeared—

For the motion	20
Against (including the chairman)	23
Majority against	3

The motion was declared negatived amidst cheers and counter-cheers.

WANDSWORTH DISTRICT BOARD.—At the meeting of this board on Thursday last, the General Purposes Committee reported that in accordance with the instructions of the Board, and upon the invitation of Colonel Bolton, they proceeded, on Friday, the 14th of September last, to inspect the works of the Southwark and Vauxhall Water Company, at Nine Elms, and went thence to the works of the company at Hampton; and on a subsequent occasion to the offices of the company, and there inspected the plans of the water-mains. They found at the works at Nine Elms that the filter-beds were being cleansed and reconstructed, and that improvements were being effected for the purpose of more effectually filtering the water. After a careful inspection of those works, the committee came to the conclusion that such works ought to be entirely removed from their present position, where they were exposed to a deleterious atmosphere. The committee were informed that land was some years ago obtained by the company at Hampton for the purpose of improving the character of the water supply. They were, however, surprised to find that nothing had hitherto been done there towards constructing subsiding-tanks and additional filter-beds, so repeatedly insisted upon by the Government inspector as the only way of ensuring the supply of pure water, and therefore recommended that the Local Government Board be requested to insist upon the immediate construction of such subsiding-tanks. They recommended that a communication be addressed to the Local Government Board, strongly urging that some measures should be at once adopted to prevent, or at least to decrease, the pollution of the water at and above the intake. The committee also reported that they had ascertained that at the ends of many streets, where there were dead ends to the mains, there was an accumulation of offensive matter in the water, and in some cases there were instances of animal life; and they were of opinion that the dead ends referred to should be regularly drawn at short intervals, with a view of removing any such accumulations. They also recommended that handbills should be circulated throughout the district, strongly urging on the public generally to see that their cisterns were regularly and properly cleansed; also that copies of the report be sent to the Home Secretary, the Local Government Board, Colonel Bolton, and the Southwark and Vauxhall Water Company.

CONTEMPORARY OPINIONS ON THE WATER SCHEME OF THE METROPOLITAN BOARD.

[From *The Times*.]

Whether their present proposal be a wise one or not, however, is a wholly distinct question, and it will, we may be sure, be most strictly investigated by the parliamentary committees before whom the contemplated Bill will come. It would be quite premature to pronounce any opinion either for or against the scheme, and if we point out its difficulties it is in no way with the view of disparaging it, but only in order to promote a full discussion of it. It is proposed to strike a new source of supply in the chalk districts in the neighbourhood of London, and it is calculated that an abundant amount may thus be obtained for purposes of drinking, and also for the extinction of fires. A constant service, it is stated, can be maintained for these purposes, and the existing supply may thus be left undisturbed, and will continue sufficient for all ordinary household uses. Now, of course, the first point to be considered is whether the assumption be a sound one, that the chalk districts can be relied upon for this amount of water; and in reference to this point the possible increase of population in the chalk districts themselves will have to be taken into account. It would be rash to anticipate a final judgment on this point, but it will probably be very keenly debated by engineers and geologists. But, supposing the supply to be sufficient for the two purposes named, it will be a scarcely less difficult problem whether the manner in which it is proposed to utilize the supply is the wisest. It would seem, at a first glance, a somewhat extravagant plan to employ the purest water we can obtain for such a purpose as the extinction of fires. Any water would be good enough for that purpose, and it would be desirable, if it be possible, to divert to these common uses the water of the existing companies. A further difficulty may arise if we inquire what security there will be that the new supply will be used solely for the two purposes for which it is intended. On the supposition, there is to be a constant supply of it, and the temptation to servants and the less intelligent householders to resort to such a convenient source will be perilous. It may be that the new supply will be regulated and paid for by meter; but, so far as this check operates, it will tend to defeat one of the most important objects for which a free supply of pure water is to be desired. Its use by the poorer classes of householders will be restricted; they will fall back for potable uses on the old supply; and, as respects sanitary objects, at all events, we shall have gained very little. This will be still more the case if the present system of payment for the old water supply be continued. The rate of payment at present is in proportion, not to the amount of water consumed, but to the value of the house. Consequently, householders will continue to pay the same charge as at present for their old supply, and numbers of them will be very little disposed to pay a further sum by measurement for the new and purer water. There seems, in fact, a complication in the scheme of two sources of supply which renders it imperative to scrutinize very minutely the calculations on which the Board depend. Their object is admirable, but whether the means they now propose are satisfactory is a question on which opinion must be held entirely in reserve.

[From the *Engineer*.]

The parliamentary notices issued by the Metropolitan Board of Works throw some further light on the nature of the plans by which it is proposed to give London the benefit of a supplementary supply of water. In the scheme laid down by Sir J. Bazalgette, Mr. Bramwell, and Mr. Easton, it was arranged that there should be four elevated reservoirs, each supplied by means of two pumping-stations. The parliamentary notice only specifies three reservoirs and six pumping-stations. The sources of supply are widespread, extending from Chelsfield and Eynsford, in Kent, to Epsom, in Surrey, and Denham, in Buckinghamshire, besides including the famous springs at Grays, in Essex. A matter of considerable interest to the inhabitants of the Metropolis is that which relates to the mode of introducing the supplementary supply into the houses. In the first place, the Act to be obtained is "to require the Board to afford a supply of water to every dwelling-house within the Metropolis now supplied with water by any water-works company, or which may be so supplied at the time when the works of the Board shall be in operation." The "necessary cistern, connecting-pipe, and other apparatus" required for introducing the new supply, is to be furnished "free of charge," but is afterwards to be repaired and maintained at the expense of the occupier. Such is to be the law, should Parliament pass the forthcoming Bill in the case of dwelling-houses already existing; but in respect to houses erected at a subsequent period, the cost of providing the aforesaid appliances is to be borne by the owner, and not by the Board. One part of the Bill is intended to "impose a condition and obligation upon all persons who may be supplied with water by the Board to take a supply of water from the water-works company." If the Board alone supplied water, the occupier might be tempted to take too much, and hence, where the Board lay on their supply, it must either be preceded or followed by the water of the company, which is to do the rough work of the house. If there are any houses to which the company has not laid on a supply, it may be presumed that this is in some out-of-the-way place which it might be very expensive to serve. As for the water itself, it would seem that the Board intend to begin by charging nothing for it, though whether they will continue to be thus generous is not quite clear. Of course, the water will have to be paid for somehow, and, if there is no specific water-rent, the cost of the whole affair will be thrown on the rates. On this point, it is observable that the Bill is to give the Board power, not only to levy a general rate upon all rateable property within the Metropolis, but "also to levy and receive a special rate, or special rates and charges, for and in respect of water supplied by the Board under the Bill."

To what extent these provisions have been discussed in the private committees of the Metropolitan Board we do not pretend to say; but it is re-

markable that so sweeping a measure should have been decided upon, after being publicly discussed, at only one public meeting of that body. Thus four hours of open discussion served to commit the Board not only to the general scheme of a supplementary water supply, but also to the various important details respecting the mode of introducing the supply. It is true that the Board were driven up in a corner with regard to time. They were called together at four days notice to decide on the water question, and when they met there were only two days intervening before the notices were required by law to appear. But this dilemma need not have arisen. An unaccountable delay had been allowed to intervene. General Sir W. Codrington endeavoured to hasten the appearance of the report from the Works Committee, but in vain. Following this delay there was the final phenomenon of a small attendance, only 36 members being present to vote out of a total of 46. The majority was as small as it well could be, seeing that it was only four, including the private vote of the chairman. Sixteen members were absent when the division took place, and there were only 17 votes for the Bill. Had the 16 members aforesaid been present and voted against the scheme, it would have been rejected by a majority of 12. All the absentees may not have been opposed to the measure, but we may infer that the greater portion of them were not disposed to vote for it. The City authorities, we observe, are careful not to commit themselves to the scheme, and prefer for the present to maintain a policy of "masterly inactivity."

In addition to this scheme for a supplementary supply, the Metropolitan Board go before Parliament for power to "buy up" the water companies. On this point very little was said the other day, but a good deal will have to be said before the little purchase is effected. Of course, the water companies will fight for their existence, unless they are conciliated by a good round sum, sufficient to satisfy the shareholders and compensate the officers. The water companies have no desire to exist apart from dividends; but they will die hard, when they do die, seeing that they will fight for the sake of getting the best possible price. In other words, they will sell their lives as dearly as they can. But scarcely anybody expects that the catastrophe will take place in the coming session. As for the supplementary water scheme, we fancy that the water companies—to use plain terms—will "make such fun" of it before the parliamentary committees, that neither Lords nor Commons will have the courage to endorse the project. There is also a serious side to the question, both in respect to engineering and financial elements. The proposed breaking-up of the foot-pavement will of itself make a lively impression on our legislators, who will be ready to ask where the public are to go while the works are in progress.

There were rumours at the special meeting of the Board that the water companies were preparing important combinations. Something of this sort has since come to pass, though the only parliamentary notice of the kind is one in which the Southwark, the Lambeth, and the Chelsea Companies are specified. The project is for a "South London (Spring) Water Company," which is to have its own wells, pumping-stations, and reservoirs, for the purpose of supplying water to a number of districts about the southern parts of London, extending from Deptford, Lewisham, and Beckenham, to Wimbledon, Richmond, and Kingston-on-Thames, going as far south as Croydon, and extending into Lambeth and Camberwell. The company seeks for power to sell or lease its undertaking to the three companies already named, or to any other company, or to the Metropolitan Board, or, in fact, to anybody, and also asks for powers of amalgamation. In short, this inchoate company asks for almost everything it can possibly ask for, whether in the shape of selling, buying, amalgamating, co-operating, or supplying. There is another scheme talked about, but it will have no footing in Parliament in the ensuing session, though it may, perhaps, be heard of. It is a scheme said to emanate from the New River Company, and consists of a plan for placing London in the hands of three companies, with some kind of central board to govern the whole. This, however, is *in nubibus*, and, so far as we can see at present, it may as well remain so.

The idea that the supplementary scheme of the Metropolitan Board will give greater security against the ravages of fire, is doubtless expected to have weight in the deliberations of Parliament. It has, indeed, been asserted that the report of the Select Committee on the Metropolitan Fire Brigade has served to spur on the Board in dealing with the water question. The recommendation that the Fire Brigade should be transferred from the Metropolitan Board to the Commissioners of Police is alleged to have caused a feeling of alarm at Spring Gardens. Hence the present scheme provides that the pure water to be furnished for drinking purposes shall be supplied under pressure, so as to feed the hydrants which are to be planted along the mains on each side of the street. If London is not properly protected against fire at the present time, the fault does not rest wholly with the water companies. When the Pantechnicon was burned down, there was a great outcry because the Chelsea Company did not have a large main close to the burning building. The cost of providing such a main would have been £800, and the entire annual payment received by the company for water supplied to the Pantechnicon was simply £2. Granting that the companies are morally bound to consider the risks of fire, there is the fact that a 36-inch main, carrying the supply of the Grand Junction Company, was within reach when the Pantechnicon was in flames. The officials of this company were at hand, and called the attention of the brigade to the fact that here was an enormous supply of water at their disposal under considerable pressure; but, nevertheless, the brigade declined to make use of that supply, apparently for the reason that the pressure would burst the hose. When the great fire was raging at the City Flour Mills, the mains were chaged with the water of the New River Company, under an immense pressure. But the intervention of the engines was considered necessary, and the benefit of the pressure was lost. For some reason or other the Metropolitan Board have never co-operated with the water companies, and the present supply has never been turned to the best account. The Corporation are certainly showing a different spirit. The City authorities are placing hydrants on to the New River mains, and will probably be found, in some degree, independent of the Metropolitan Fire Brigade. At the same time the New River Company are extending the limits of the constant supply. As their water is of good quality, the City will thus be placed in the possession of all that is promised by the dual scheme of the Metropolitan Board. It is, therefore, no great marvel that the authorities of the City display some lack of enthusiasm in respect to the plans of the Metropolitan Board.

[From the *Builder*.]

The Metropolitan Board of Works have lost no time in giving a distinct answer to the question which the *Builder* put to that worshipful body, on the appearance of the report of Sir J. W. Bazalgette, Mr. Bramwell, and Mr. Easton, in August last. "In fact," we wrote, "it comes to this: Are we to put the cart or the horse first? Are we first to ascertain what it will cost to give a central body—the Metropolitan Board or any other—the full control of the water supply, and then to see how this may be partially or wholly improved? or are we first to attempt partial improvement, and then to find that, at additional cost, owing to our want of foresight, we have to acquire the general control?"

To this practical question a definite reply was given, on the 14th inst., by the report of the Works and General Purposes Committee on the reference of the Board, of the 23rd of February, 1877, and also on the resolution of the Board of the 23rd of March last, instructing the engineer to report jointly with Mr. Bramwell and Mr. Easton. The committee have come to the conclusion that it is indispensable to present to Parliament a perfect scheme. They have, therefore, drawn up a Bill which is to carry both the horse and the cart. They ask for power to make the compulsory purchase of the existing water companies, and at the same time to carry out the plan of the engineers consulted for a supplementary supply. As to the serious character of the undertaking thus sketched out, we have the assurance of Mr. Roche, who moved the adoption of the report, that the Board "were not afraid of the magnitude of the work before them, nor were they afraid of the expense." It has yet to be seen whether the ratepayers are equally courageous.

It must be observed that the mode in which this gigantic scheme has now been brought before the public touches the question of expense to the metropolitan residents with gentle hand. "They considered that the supply of water could be obtained from the proposed new works, and effect a saving of about £70,000 per annum." We quote from *The Times* account of the special meeting held to receive the report. That, so far as the notice given by the Works and General Purposes Committee goes, is the cheerful prospect which is now offered to the ratepayer—a saving of £70,000 per annum. But a saving to be effected on what? On actual present cost, of course, thinks the unprejudiced reader. Alas! this simple grammatical sense vanishes as the scheme is more carefully investigated.

It is remarkable that in an account occupying a column of the *The Times*, and presumably giving a fair view of the essential parts of the report, as well as of the speech of its mover, not a single word is said as to what, after all, is the first question raised. What is the purchase of the existing works to cost? Of course, if £70,000 per annum are to be saved to the ratepayer, that same cost matters little to him. It is only our uncomfortable suspicion as to the reality of the saving in question that leads us to put any further questions. As far as these questions can be answered from official documents, the reply is not reassuring. The cost of purchase, as to which the Board of Works are discreetly silent, has, however, been estimated by the gentlemen called on by the Board to report. The only inconvenience is, that their report was drawn up from a different point of view from that now adopted by the Board. That point of view seemed to us to be that it was desirable to get in the small end of the wedge. Therefore, it was pointed out how small that edge was; but, unfortunately, its narrowness was illustrated by a reference to the great width of the broad end, and now that the entire wedge is brought out before the world, this former admission as to its magnitude is memorable, and may prove inconvenient. "If the governing body of the Metropolis were," said the reporters of August last, "at a cost of from 20 to 25 millions of money, to acquire the existing water companies, it would find that this expenditure was merely a first step in the outlay, and thus the £25,000,000 would have to be supplemented by a further, and perhaps an almost equal, outlay." The first instalment, then, for which the ratepayer is to provide is from 20 to 25 millions of money, and the larger sum is assumed as probable by Sir J. Bazalgette, Mr. Bramwell, and Mr. Easton. Concurrently with this the 5½ millions required for the scheme of these gentlemen are to be found. Thus the scheme starts with a cost of 30 millions sterling, with more than a hint that, under certain contingencies, it may cost 50 millions sterling. The Board and their spokesmen have the inconvenient adroitness of justifying their own plans at the moment by showing how much more plans of some other kinds would cost. "Lay out 5½ millions," say the reporters, "at once, for fear you should be asked for 30 millions, or even for 50 millions, by-and-by." "Pass our Bill now," says Mr. Roche, four months later, "because you must remember that if the water companies were compelled to put on a constant supply, the ratepayers in a few years would be called on for about 3 millions of money." Three millions of money—that is to say, per annum.

Now, is it not well to ask ourselves whether this is altogether a reassuring mode of attacking a question of such signal importance? If we dismiss, as we hope we may do with propriety, any idea of want of candour, or of an attempt to steal a march, or to get in, as before said, the small end of the wedge, can we allow that the matter has been treated with the forethought, gravity, and statesman like ability which it so imperatively demands? Are these sums of 5½, 30, 50—up to 80 or 100 millions—which are thrown like shadows on the screen of the future, matters to be so lightly dealt with? We cannot admit such to be the case. The Board of Works may, it is true, be in possession of a carefully digested project, of which all the inconveniences have been foreseen, all the difficulties provided for, and the ultimate cost duly counted. If so, they have done themselves great injustice by not taking into their confidence the ratepayers, with whose money they propose so freely to deal. If otherwise, they have been guilty of the greater injustice towards these same ratepayers.

Let us look for a moment at what we may call the minimum sum of 30 millions sterling as required for the first setting up of the new water supply authority. We think we are right in saying that the loans hitherto raised by the Metropolitan Board of Works, taking into account both rate of interest and rate of issue, bear something like an interest of 3¾ per cent. on the actual amount of money raised. Of course, if these loans had to be paid off, there would be a further loss; but we are regarding them as permanent. The actual income of all the existing water companies is a little under £1,200,000 per annum. The incidence of rate, which provides this income, is 6s. 6d. per head per annum; the total incidence of the metropolitan rates being 50s. per head per annum, out of which one-eighth thus goes to pay for water. The actual cost of distribution of the present supply is a little over £460,000 per annum. Messrs. Bazalgette, Bramwell, and Easton allowed in their estimate £32,500 for cost of distribution. As this scheme proposed to serve as many houses as are now supplied, besides providing an instantaneous supply at 75,000 separate hydrants, the contrast between the actual and the proposed expenditure partakes of the nature of the ludicrous. Even with that drawback, we still find a sum of £490,000 per annum, at least, will have to be provided for working costs; £800,000, perhaps, would be nearer the mark, but let us take the smaller figure. Here is an additional 2s. 9½d. at one blow added to the existing rate of 6s. 6d. per head. And if we look forward to the highest charges intimated as possible by the Board of Works, we shall find that the ratepayers will have occasion to congratulate themselves if their actual water-rates are not doubled in the future.

If this were all, serious as it would be, the change might even be worth this enormous cost. Supposing any authority, in the professional and financial competence of which implicit confidence could be placed, were to come forward and say, "The evils of the actual water supply of the Metropolis are known and admitted. We are able to show how they may be remedied. We will provide every house with a sufficient supply of pure drinking water—namely, two gallons per head per diem. We will also supply 28 gallons of rain or other water per head per day for purposes of cleansing, sewage, street-watering, manufacturers, and the like. We will so arrange that it will not be easily in the power of an idle servant or

a careless occupier to take the common water for drinking purposes instead of the pure water. And we will keep a minimum head of 100 feet of water on each of 75,000 hydrants distributed over London; the pipes being large enough to deliver a jet of 2000 gallons per minute from each hydrant. The cost of this will be, say, 14s. per head of the population per annum." Suppose this offer to be made, and to be made with material guarantee for the fulfilment of their part of the contract by the proposing purveyors of water, the ratepayers would, in our opinion, do well to think twice before rejecting it. High as would be the price, far be it from us to say that it would be too high. If the two great requisites of immunity from any possible source of disease arising from water or want of water, and of comparative safety from fire in consequence of the presence of an ever-available and ample supply of water, were secured, it is very possible that three millions sterling a year would not be a ruinous price to pay for such immense benefits.

What we do object to, however, is that the certitude, at present, is altogether on one side. That extra cost to the ratepayer will be increased by the compulsory purchase of existing water-works is shown as clearly as possible—though it is not directly stated—by the report of Messrs. Bazalgette, Bramwell, and Easton. That any advantage, in any way, will accrue to the ratepayers by such a transfer, is a point left entirely in the dark. No evidence, no argument, is offered in order to show that such will be the case; in fact, the Bill as now proposed to be sent before Parliament may be taken as evidence to the contrary. The main advantage of a concentrated administration, in a financial point of view, has always been represented as lying in the disuse of duplicate works. But the introduction of a complete set of duplicate works is to accompany the transfer. Any idea, then, of utilizing and improving the existing apparatus of supply by combining the different apparatus is abandoned. "Put all in our hands," says the Metropolitan Board; "it will only cost you ten or twelve millions of money." "What shall we gain by doing so?" asks the ratepayer. "Oh! you will have unity of action; and concentration of power to deal with the matter; and so forth," is all the reply. "Shall I have a single drop of water more, or a grain less of impurity in the gallon?" asks the ratepayer. "As to that, we have other things to propose. You shall have more and better water. For that, however, you will have to pay separately, of course." That is how the matter stands at present.

That the Bills of the Metropolitan Board of Works will become law in the ensuing session of Parliament, we suppose no one seriously imagines. No persons, we should conceive, would be more disgusted at such a result than the legal gentlemen whose medium of life is in the stormy skies of Parliamentary Westminster. For the matter to receive a preliminary threshing is, no doubt, all that can be expected in 1878. But even as to this, the ratepayers should not be too secure. It would be quite consistent with that magnanimous fearlessness of expense of which Mr. Roche boasts, for the Board to make direct and private offers to the several companies, such as the directors of the latter would not feel justified in refusing. Indeed, if it be decided that, *coûte que coûte*, the expropriation is to take place, it is probable that a little timely extravagance in this way would be an ultimate saving. The value of the water companies stock is calculable by any accountant. The per centage due to any one for forcible expropriation is also capable of valuation. If it comes to serious negotiation, there would not be room for very material difference between the sellers and the purchasers in the case. The former, Parliament in view, could not stand out for a fancy price. The latter, under the same control, could not offer anything under the amount of a professional valuation. The difference in such a case could hardly amount to the certain cost of a long parliamentary conflict. Therefore, if the Board were wise, and also resolute, and if the companies, whether resolute or not, were wise too, all parties might shake hands before the Bill came into committee.

But, in that case, who would represent the people of London? Have they given to the Metropolitan Board, who are, or ought to be, not their masters, but their servants, *carte blanche* on this subject? Have they given them authority to pledge the rateable property of the Metropolis for £1,200,000 per year, or for any sum between that and £3,000,000, in order to get the control of the water supply? Surely, not yet. There must be clearer statements and more precise figures first.

[From the *Saturday Review*.]

The Metropolitan Board of Works, having determined by a small majority to buy the undertakings of the London Water Companies, may, perhaps, promote a Bill for the purpose in the approaching session; but a majority of three in a Board of thirty members indicates a serious division of opinion, and the question is to be reconsidered. The purchase has often been discussed; and those members of the Board who have taken an interest in the question probably understand the subject better than their voluntary advisers in the press. A purchase of any commodity at a fair price is not a process which justifies enthusiasm, although it may, perhaps, be prudent and desirable. To the consumer it matters little whether water from the Thames and the New River is supplied by a company or by the Board of Works. There is no reason to expect either an increase or diminution of price, or a change of quality in the existing supply. If the Board, after purchasing the water-works, adopts the scheme of the eminent engineers who have lately been consulted, the ratepayers must be content to pay an additional price for comparatively pure water. It is not known whether the minority of the Board objected to the proposal of Mr. Bramwell and Mr. Easton, or to the purchase of the property of the water companies. The sums which it would be necessary to borrow for the purpose would make a large apparent addition to the debt; but the operation would have no injurious effect on the credit of the Board. The money would be borrowed at 3½ or 3¾ per cent.; and the water-rents would constitute the best possible security for the payment of the interest, even if the rates of the Metropolis were not also mortgaged to the lender. It is even possible that a large increase in the amount of metropolitan stock might to a certain extent raise its price in the market. Securities for large amounts are always more saleable if other conditions are equal. Capitalists are well aware that municipal bodies are in no danger of impoverishing themselves by acquiring a monopoly of one of the first necessaries of life. Until lately corporations were more eager to acquire gas-works than water-works, because they generally produce a higher rate of profit. The fear of new discoveries in the art of lighting has lately checked the desire to buy up the undertakings of gas companies; but it is not likely that any other liquid will supersede water.

If the Board proceeds with the measure, it will be for the interest of all parties to arrange the terms of purchase by voluntary agreement. It would be extremely difficult to prove a case of public benefit sufficient to justify a compulsory sale. Up to the present time there is only one precedent for transferring the water supply from an unwilling company to a corporate body; and the local circumstances on which the decision was founded were peculiar and exceptional. Even if committees of the two Houses were to sanction a compulsory purchase by the Board of Works, they would impose terms which might probably be obtained in the first instance by amicable negotiation. The arguments for the acquisition of water-works by municipalities are neither wholly imaginary nor extraordinarily forcible. It is in some respects convenient that the sanitary authority should dispose of the water of which it has power to enforce the use; but, on the whole, the supply is administered nearly in the same manner by companies and by corporations. The balance of theoretical argument inclines to the side of municipal administration. Existing legislation has vested in the consumers, who are practically the same with the ratepayers, the surplus profits of water supply, after a certain dividend has been paid. Companies which have attained their maximum dividend have, therefore, no legal interest in the additional profits which may accrue, although it has hitherto been the general practice of Parliament to allow them to raise capital for the extension of supply on advantageous terms. The shareholders are virtually trustees for the domestic consumers; and it is consistent with legal analogy to vest the whole estate in the possessor of the beneficial interest. There is, perhaps, a risk of malversation in the control by the ratepayers of the price at which water is sold for commercial and industrial purposes. Large consumers, who have no means of exercising influence over boards of directors, might, perhaps, as members of a corporation, contrive that the price of water, sold by meter, should be unduly reduced for their own advantage; but it is hardly necessary to provide artificial protection for the municipal constituency, who have in their own hands the remedy for misconduct on the part of their representatives. The only motive of shareholders for objecting to compulsory or voluntary purchase is a suspicion that they may not obtain the full value of their property. No sentimental value attaches to pipes or reservoirs, which are only represented to the proprietor by half-yearly dividend warrants.

The immediate occasion of the adoption of the policy of purchase by the Board of Works is the project for providing a supply of water, from the chalk, for the purposes of drinking and of extinguishing fires. It might, perhaps, be more accurately said that, but for the report of the committee on the prevention of fires, no change would have been introduced at present. The statement which is often made in leading articles that the London water supply is defective in quantity, furnishes one among many proofs of the ignorance of the writers on the whole matter. More than 34 gallons per head are supplied by the water companies to the inhabitants of London, which is but partially and incidentally a manufacturing town. For the whole population, if all its wants are taken into consideration, 20 gallons per head would, with proper fittings and regulations, be amply sufficient. The quality of the water is more fairly open to comment, for, notwithstanding all filtering appliances, it satisfies neither the taste nor the imagination. Fastidious water-drinkers know that the Thames, from which the supply of the West-end is drawn, receives much pollution during its course. The æsthetic objection is not effectually removed by knowledge of the fact that the intrusive matters are by a natural operation rendered innocuous, or rather transformed into harmless substances before they reach the intakes of the water companies. The only unpleasant result of the analysis of the water, as it is delivered to the consumer, is the disclosure which it contains of previous, as distinguished from actual, contamination. The London water may be compared to a repentant prodigal who has sincerely and finally abandoned his evil practices. It was polluted in the upper course of the river; it is sufficiently pure as it is delivered to the consumer. Practical experience confirms the guarantee for the behaviour of the convert which may have been tendered by his sponsors. No water is more wholesome than that of London; and the only outbreaks of zymotic disease which have been attributed to its use were clearly traced to local contamination near the point of delivery. The same causes would have equally affected the sanitary quality of rain water or distilled water. The very eminent chemist who publishes periodically reports on the London water supply has always candidly admitted that his theory of indestructible germs of disease, which may in his judgment be conveyed by water, has not been as yet proved either by analysis or by practical results.

The project of a separate supply for hydrants and for purposes of drinking is at first sight, in some respects, paradoxical. It is equally unnecessary that drinking water should be laid on with strong pressure, and that water for fire-engines or hydrants should be ideally pure. The proposed supply will involve the expense and inconvenience of separate fittings to resist extraordinary pressure. If the supposed necessity for pure water is for the time left out of consideration, there seems to be no reason why high-level reservoirs for fire purposes should not be supplied either from the Thames in London, or from the existing sources. The hydrants and the necessary mains would then be the only distributive apparatus, and the expense of new domestic fittings would be avoided. There would undoubtedly be an advantage in constant supply; but the companies are already bound to introduce the system as soon as the Board of Works or the consumers have made the necessary alteration in the fittings. A part of the East of London actually enjoys constant service, with much advantage to the consumers, and probably with benefit to the company through diminution of waste. Mr. Bramwell and his colleagues have, of course, not failed to consider the more obvious objections to their scheme. It will remain for the Board of Works—or, if the proposal is embodied in a Bill, for the parliamentary committees—to consider whether the demands of the Fire Brigade might not be more cheaply satisfied. It is more than doubtful whether consumers and ratepayers will consent to incur a heavy expense for the gratification of their fancy. Additional security against fire will produce a certain return in the form of confidence and comfort, even if the insurance companies decline to reduce their premiums.

THE SUPPLY OF WATER TO THE METROPOLIS.

At the First Ordinary Meeting for the Session, of the Society of Arts, London, on Wednesday, the 21st inst., Mr. William Hawes, F.G.S., deputy-chairman of the council, presided, and, in the course of his opening address, he made the following remarks on the question of the Water Supply of the Metropolis:—

A large portion of the time of the council has been occupied for several years past in the study of the laws of hygiene, and their application to the supply of water, to ventilation, to drainage, to general cleanliness, to domestic economy, thereby assisting in the improvement of the health, and consequent longevity of the people, so as to remove from us, as a nation, the opprobrium of allowing thousands of our population to die annually of preventible diseases, which exist and are disseminated for want of proper attention to principles which all now admit to be essential to the health and well-being of the population, at present unavoidably crowded together in our great cities in unwholesome habitations. I cannot to-night do more than give a brief sketch of the proceedings of the committees appointed to consider the improvements which have already been introduced into the management of these great national questions, and the progress which is being made in the introduction of sanitary appliances.

To supply a sufficient quantity of water for the protection of life and of the buildings and property of this great city from fire, which, large and full of wealth as it is, seems to be ever increasing, is of the utmost importance; but to secure a supply of water of sufficient purity to ensure, as far as human skill can do, the immunity of its millions of inhabitants from

preventible sickness and disease, is of even greater importance. Apart from the suffering entailed upon individuals by the loss of time and cessation from useful labour, it represents in the aggregate a large loss of wealth to the nation. To obtain a sufficient quantity of good water, and then to distribute it so as to meet the wants of the general public for household and drinking purposes, for the extinction of fires, and for our manufacturers, is now occupying the attention of engineers and philanthropists; but I fear success in the accomplishment of the vast works required fully to remedy acknowledged evils, and to overcome the opposition of existing interests, will only be attained when the country, by some great mortality, is made sensible of the disgrace of allowing the continuance of the present insufficient and dangerous system, and resolves that the preservation of the public health is a matter of first necessity and of national economy, and demands that a national effort shall be made to secure, not only for the Metropolis, but for every city and town, the inestimable boon of an ample supply of pure water.

But, whilst admitting the necessity of improvement in the supply of water for all purposes, do not let us be led too easily into a lavish and extravagant expenditure, and at the same time to the destruction and waste of a large amount of property now very profitably employed in the collection and distribution of water.

It appears to me to be better to direct our attention to the improvement of our present supply, by collecting it from better sources, than to promote the establishment of a separate supply of potable water.

Many improvements may be introduced, I have no doubt, in the arrangements, for the night service to be available at a moment's notice in case of fire. Much, however, has been already done in this direction by the water companies, and by the activity of the Fire Brigade; and, for the removal of the still existing grounds of complaint, we must, I think, look more to wholesome pressure being put upon the water companies, than to the establishment of a new system. I shall be very sorry to see, as some advocate, the transference of the management of our water supply either to the Government or to the Board of Works. Indifference towards the progress, management, and principles involved in the administration of our public works is growing too rapidly to allow another great branch of municipal administration to be withdrawn from independent control, and placed under official direction, without a protest from a society which has always been distinguished by its advocacy of the greatest freedom of action in all matters relating to the social and industrial progress of the people.

We are often told to look to the success of the main drainage and of the Embankment, both executed under the direction of the Board of Works; and Liverpool and Manchester are both referred to as evidence of the advantages to be derived from placing the supply of water under the management of their respective corporations; but the same grounds for anticipating advantageous results do not exist here. Two or three of our companies are each of them supplying a larger quantity of water than is supplied by the corporation works in those towns. Were the purely administrative expenses of all the London companies saved, the resulting economy to each house would be trifling; therefore I think the question must be considered, first, rather with a view to improve than to destroy our existing establishments. Nevertheless, the knowledge we possess of the gradual lowering of the level of the water in the chalk would lead us to ascertain, by experiment, what quantity of water would be supplied by one of the many wells proposed to be sunk, and also what might be the effect of a period of drought on such supply. This is one of those subjects upon which a great deal may be said, and very popularly said, without a due appreciation of the difficulties to be overcome, and the alterations and expenses they must entail upon property in every city and town where proper water-works and a double service system are introduced, to the displacement of the established means of supply. Practically, to secure a supply of pure drinking water involves a separate system of supply and delivery; the water must be brought from special sources; the expense, except in the size of the mains, will be the same as for ordinary water-works; there must be distinct house services, and, unless this is made compulsory, it would, I fear, be a long time before householders would adopt such a double system, for it would be difficult to convince them of the advantages to be derived from it.

GAS TESTING IN THE METROPOLIS.

The "Notification of the Gas Referees" for the Winter Half Year, 1877-78, contains an Appendix giving a description of the standard burners to be used for testing common gas and cannel gas.

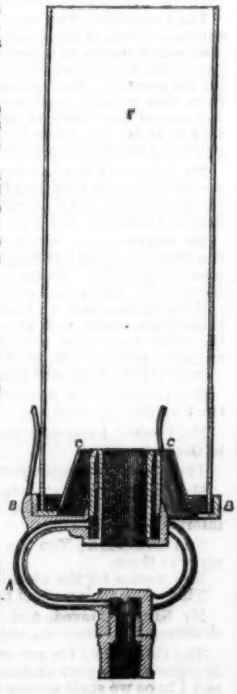
Common Gas.

The burner which has been adopted as the standard burner for testing common gas was designed by Mr. Sugg, and was called by him "Sugg's London Argand, No. 1."

A half-sized section is appended, in which A represents a supply-pipe, B the gallery, C the cone, D the steatite chamber, E the chimney.

The following are the dimensions of those parts of the burner upon which its action depends:—

	Inch.
Diameter of supply-pipes	0·08
External diameter of annular steatite chamber	0·84
Internal diameter of ditto	0·48
Number of holes	24
Diameter of each hole	0·045
Internal diameter of cone:	
At the bottom	1·5
At the top	1·08
Height of upper surface of cone and of steatite chamber above floor of gallery	0·75
Height of glass chimney	6
Internal diameter of chimney	1¼



Cannel Gas.

The standard burner for testing cannel gas is a steatite bat's-wing burner, consisting of a cylindrical stem, the top of which is divided by a slit of uniform width.

	Inch.
External diameter of top of stem	0·31
Internal diameter of stem	0·17
Width of slit	0·02
Depth of slit	0·15

GEORGETOWN (BRITISH GUIANA) GAS COMPANY, LIMITED.

The Ordinary General Meeting of this Company was held on Tuesday last—T. Hughes, Esq., Q.C., in the chair.

The Secretary (Mr. Alfred Lass) having read the notice convening the meeting, and the minutes of the last meeting, which were confirmed, the following report and accounts were submitted:—

The directors have much pleasure in submitting to the shareholders the accounts of the company for the half year ending June 30, 1877.

These, with the annexed report of the engineer, show the progress of the company.

The directors have to state that the profit for the half year has amounted to £1400 2s. 6½d., and that after paying the interest on debentures, &c., there remains an available balance of £1271 18s. 4d., out of which the directors recommend the declaration of a dividend for the half year ending the 30th of June last, on the preference share capital, at the rate of 8 per cent. per annum, and on the ordinary share capital at the rate of 5 per cent. per annum, both free of income-tax, leaving a sum of £414 10s. 4d. to be carried forward to the next half year's account.

The dividend, if sanctioned, will be payable on the 1st of December next.

Engineer's Report.

Having forwarded the whole of the half-yearly returns to June 30, 1877, I hope they will be found correct, and that the working will be considered satisfactory.

During the half year 20 houses have been fitted with 279 lights, and 96 additional lights, making a total of 375, to which may be added 4 stoves and 16 public lamps.

The demand for gas is still very good.

Coke and breeze have realized fair average prices.

During the last half year there has been a demand for ammoniacal liquor, which, if maintained, will increase the revenue.

The gas-fitting department has progressed favourably.

The whole of the buildings are in good order.

The engineer's monthly reports, together with the carbonizing statements and other returns, have kept you fully informed upon all matters relating to the working.

The addition to capital account for the last half year is for laying 2-inch mains in Albert Town, Princes Street, and Green Street, the erection of a foreman's dwelling-house, offices, and show-rooms, together with the partial erection of a new river wall.

In conclusion, I beg to thank you for the attention you have paid to our wants in Georgetown.

(Signed) Thos. B. Younger, Engineer and Manager.

Dr. *Balance-Sheet, June 30, 1877.* *Cr.*

Share capital—				Fixed plant, mains, and services, as per last account	£33,330	9 2½
6200 shares, at £5 fully paid up	£31,000	0 0		Add since expended	994	12 7½
Preference shares	2,060	0 0		Stock in hand	3,651	1 2
Debenture bonds	6,400	0 0		Cash at bank and in hand	1,196	19 5½
Retort renewal-fund account	82	10 1		Bills receivable	1,109	0 0
Bad debt fund	50	15 0		Amounts owing by sundry persons	2,033	19 4½
Bills payable	388	13 9				
Amounts owing to sundry persons	664	4 8½				
Suspense account	348	19 11½				
Profit and loss account, net revenue	1,271	18 4				
	£42,267	1 10			£42,267	1 10

Revenue Account.

Coals and bitumen	£937	14 3	Gas and rental of meters	£3,182	13 4
Purifying account	45	18 1	Residual products and fittings, &c.	825	1 9½
Wages account	454	7 0½			
Repair and maintenance of works and plant, &c.	306	4 3			
Salaries	513	15 8			
Rent, rates, and taxes	75	7 3½			
Directors and auditors fees	155	5 0			
Trade and general charges	55	8 2½			
Bad debts and allowances	59	4 3			
Law charges	4	8 6			
	£2,607	12 6½			
Balance carried to profit and loss, net revenue	1,400	2 6½			
	£4,007	15 1½		£4,007	15 1½

Profit and Loss Account, Net Revenue.

Dividend, &c., paid to shareholders to Dec. 31, 1876	£702	8 0	Balance brought from last account	£821	9 10½
Interest on loans, debentures, &c., to June 30, 1877	218	14 10	Revenue account, balance brought down	1,400	2 6½
Income-tax	28	11 3			
Balance carried forward to next half year's account	1,271	18 4			
	£2,221	12 5		£2,221	12 5

The Chairman then said: I presume the shareholders will take the report and accounts as read, and I will, therefore, proceed to move—"That the report and accounts now submitted to the shareholders be received and adopted." I am happy to be able to say that the position of the company has improved in a very marked manner since our meeting at the end of the corresponding half of 1876. It will be in the recollection of the shareholders then that, in consequence of the unhappy conduct of the company's chief officer in Guiana, a very considerable loss had occurred to the company, and the shareholders on that occasion met it in the way in which the board recommended, and which I believe to be the only method of meeting such an unfortunate occurrence—by writing off a very large sum, so as to place the finances on a thoroughly sound and satisfactory basis. The shareholders will also recollect that at that time there were doubts about the stability of some of the new works of the company. I am happy to say—and, no doubt, you have already seen from the engineer's report—that this danger has disappeared, and that all the works of the company at Georgetown are in thoroughly good order and repair. Since the last meeting, too, we are glad to report that the sea-wall has been finished. This, I apprehend, and the board believe, will be a very important addition to the value of the property of the company. The new offices have also been finished, and the foreman's house built. This we felt was necessary for the proper conduct of the work there; so, in fact, we have to give a really satisfactory account of the condition of the company's works, and of the state of affairs in the colony. Turning to the balance-sheet, I do not know that there is any particular necessity for dwelling upon it; but there are, perhaps, one or two points to which it may be desirable to call the shareholders attention, in case no question should be asked respecting them. In the first place, those who have studied the balance-sheet will see that the amount of bills outstanding is very considerably less than it was at this time last year—whereas then there was more than £2000 outstanding on bills payable, at present that amount has been reduced to something under £400. This, the board thinks, is a favourable and healthy sign in the company's business. The amounts owing have also been largely reduced; whereas at this time last year they amounted to over £1200, they now only amount to a little over £600, so this item has really been reduced half. On the other side of the balance-sheet the shareholders will see that there has been a small addition to the fixed plant and property of the company. The present amount of this item is £34,200, and last half year it stood at £33,300. This small addition has been caused by the works and buildings, of which I

have already spoken—the sea-wall, the new offices, and the foreman's house; and we consider that those are very valuable additions, making the property of the shareholders of more value in proportion to the amount that has been laid out on them. The stocks in hand are very largely in excess of what they were at this time last year—whereas this time last year they stood at £2900, now they are £3600; and that I believe is almost entirely owing to the amount of coal which is on the premises, and, of course, that is an item which is very satisfactory. The only other item in the balance-sheet to which I think attention need be called is the amounts owing by sundry persons. This stood this time last year at £2344, and now the amount is £2053. This is also a sign of the healthiness of the company's business, and of the care and ability with which at present the company's business is being conducted by the new manager—Mr. Younger. If we go to the revenue account, I do not think there is anything to say. The amounts are pretty nearly the same through all, with one exception, which is the most interesting to the shareholders and the board—that the profit, instead of coming out at £899, which was really nominal, and which we wrote off, as I have already stated, amounts on this occasion to £1400. I have no further observation to make, and will therefore proceed at once to move—"That the report and accounts now submitted to the shareholders be received and adopted."

Mr. CLARKE seconded the motion, which was carried unanimously.

The CHAIRMAN then moved—"That a dividend at the rate of 8 per cent. per annum on the preference stock, and at the rate of 5 per cent. per annum on the ordinary stock, free of income-tax, be declared for the half year ending the 30th of June last."

The resolution was agreed to.

Mr. HEWETSON proposed, and Mr. STOKES seconded, a vote of thanks to the chairman and directors.

The CHAIRMAN, in reply, said: Gentlemen, we are very much obliged to you. We have done our best, as we have always done; but, fortunately, our best this year has been attended with better results than last year, and I trust it may be as good or better in future.

The meeting then terminated.

BOMBAY GAS COMPANY, LIMITED.

The Half-Yearly Meeting of this Company was held at their London Offices, 4, Great Winchester Street, on Thursday, Nov. 21—D. T. EVANS, Esq., in the chair.

The SECRETARY (Mr. W. Marshall) having read the notice convening the meeting, the following report and statements of account were submitted:—

Your directors have pleasure in submitting to the shareholders a statement of accounts duly audited, for the half year ending the 30th of June last.

The condition of the company is satisfactory.

As compared with the last half year there has been an increase in the gas and meter rental; and the number of private consumers is steadily advancing. The sales of coke and tar have been satisfactory, and show an increase.

The reduced rates of freights prevailing during the six months under review have induced your directors to lay in a considerable quantity of coal at a very low price.

The rates of exchange have continued adverse, and the loss has amounted to £2814 0s. 6d. Your directors have deemed it expedient to charge profit and loss, on account of exchange, with £2000, as against £1000 so appropriated last half year, leaving £814 0s. 6d. at the debit of exchange equalization account to be dealt with at the close of the year.

The amount standing to credit of profit and loss for the half year is £9604 4s. 6d., which with the balance of £256 14s. 3d. brought forward makes £9860 18s. 9d. After appropriating £500 to the reserve-fund, and writing off from the same £248 14s. 3d. (raising the reserve-fund to £8546 12s.), and providing for debenture interest, the balance of general revenue account is £9014 8s. 9d., out of which your directors declare an interim dividend of 3½ per cent. for the half year, free of income-tax; leaving a balance of £614 8s. 9d. to be carried to the credit of the current half year

The dividend will be payable on and after the 1st day of December next.

General Balance, June 30, 1877.

Dr.			*Cr.*		
Capital authorized—(50,000 shares, at £5 each—£250,000.)			Construction account	£203,195	10 8
40,000 shares, £5 paid	£200,000	0 0	Added this half year	492	6 3
10,000 „ £4 paid	40,000	0 0		£203,687	16 11
Debentures	11,550	0 0	Less written off preliminary expenses	200	0 0
Amount owing by the company	3,873	9 2		£203,487	16 11
Reserve-fund £8,295 6 3			Exchange equalization account	814	0 6
Added this half year 500 0 0			Goods *in transitu*	3,061	18 4
	£8,795 6 3		Retort account	825	15 6
Written off for depreciation & preliminary expenses 248 14 3			Stocks, viz.—		
	8,546	12 0	Chandeliers, brackets, &c.	5,370	9 1
Insurance-fund	1,544	2 8	Brass and iron goods, &c.	5,485	1 6
Passage-fund	383	17 11	Mains, services, tools, &c.	2,260	1 4
Balance to general revenue account	9,014	8 9	Meters	2,432	19 3
			Coal	23,515	17 7
			Residual products	472	19 3
			Amount owing to the company	4,128	9 8
			Cash at bankers, on deposit, and in hand, viz.—		
			In Bombay	8,135	19 3
			In London	1,321	2 4
			Bank bills in hand	14,700	0 0
	£274,912	10 6		£274,912	10 6

Profit and Loss Account.

Coal carbonized	£7,841	17 9	Gas and meter rental	£19,556	15 0
Wages	1,192	19 0	Coke, tar, fittings, &c.	4,829	4 11
Purifying	13	4 0	Interest account	12	8 8
Maintenance of retorts	165	3 1			
Trade and general charges	767	9 1			
Salaries and collectors commission	1,817	11 1			
Rents, rates, and taxes	312	11 3			
Directors and auditors remuneration	676	5 0			
Law charges	7	3 10			
Exchange account	2,000	0 0			
Net profit	9,604	4 6			
	£24,398	8 7		£24,398	8 7

General Revenue Account.

Interest on debentures	£346	10 0	Balance, Dec. 31, 1876	£9,856	14 3
Amount carried to reserve-fund	500	0 0	Less dividend paid June 1, 1877	9,600	0 0
Balance carried down	9,014	8 9		£256	14 3
			Net profit for half year ending June 30, 1877	9,604	4 6
	£9,860	18 9		£9,860	18 9
			Balance brought down	£9,014	8 9

The CHAIRMAN: Gentlemen, the report and balance-sheet, which have been circulated amongst you, enter so fully into the operations of the company for the half year under consideration, and show so copiously and correctly our position, that I need only detain you for a short time with any remarks of my own. You will remember that we are now working under totally new and different conditions to those which were in existence when we had matters under review twelve months ago. We are now working under a new contract, by which we supply the Municipality of Bombay with 750 more public lights than we supplied under the old contract. During the half year ending June, 1876, the number of cubic feet of gas supplied by us (under the old contract) for the public lighting was 18,468,000, whereas under the present contract the quantity supplied to public lamps in the six months was 24,236,000 feet, showing an increase of 5,768,000 feet, while our revenue from this source remains substantially the same, being only about £10 more. Then, with regard to the private lighting, we supplied in the half year ending June, 1876, 10,663,600 cubic feet of gas, whereas in the half year now under review we supplied 11,124,500, showing an increase of about 460,000 cubic feet. It must be borne in mind also that the charge for gas to private consumers was reduced on July 1, 1876, from seven to six rupees. Notwithstanding that fact, however, the revenue of the company shows a very slight diminution, proving that the anticipated effect of the reduction has come into play; and I am happy to say it has continued to the present time. With reference to coal, which is a material element in our working, I may state that we continue to avail ourselves of low freights and cheap prices. On the 30th of June last we had 12,000 tons of coal in stock on the works, a stock sufficient for eighteen months supply. Since then we have chartered 8,000 tons more, which will arrive about the beginning of the new year. All this is Australian coal. We have ceased to ship English coal because we have had two or three awkward firings with it. English coal contains more iron pyrites, and the heat of the climate and the moisture during the monsoon seem to affect it; at all events, we have had two or three serious losses from the self-ignition of that coal, and therefore we are now using Australian coal almost entirely, although we have some English coal still in stock. It will be satisfactory to you to know that we are putting Australian coal into the works at the present time at the lowest rates we have ever paid since we have been a company. The sale of coke during the past half year shows a slight falling off, which may be attributed to the cheapness of coal in Bombay. I hope, however, that we shall soon resume our usual course in this respect, and do as well as we have heretofore done. The sale of tar has been satisfactory, and shows an increase of £160 in the half year. I have now to touch upon the most serious item in our accounts affecting the welfare of the company, and that is the loss on exchange. This has been inevitable, and very severe, It amounted to £2814 in the half year, and, as I say, it was totally impossible to avoid it. In the previous half year there was no loss under this head, because we brought home no money. Last half year we brought home £31,000 in Bank bills, and the rate of exchange was 1s. 10d. and a slight fraction per rupee. I trust that the exchange will work favourably for us. The rate generally improves in January and February. The unfavourable rates which have prevailed have arisen mainly from the depreciation in the value of silver; and I think it has been satisfactorily shown that the fall in the price of silver has not been due to increased production, but to the interference in its value by the heavy sales, amounting to nearly fifteen millions, by the German Government, who have demonetized silver. It was expected that they would only sell about twelve millions, but they have already much exceeded that, and have still more to sell. This has depreciated the value of the metal, and has operated very seriously against us. Gentlemen, I am happy to say that our works are in a sound and satisfactory condition. With regard to our debentures, I must remind you that last half year we paid off £3300; next January we shall pay off £5000, and I have no doubt that the following year will see the whole of the remainder swept away. The new contract with the Municipality is working satisfactorily, and there is also a steady and continuous increase in the private lighting, not only as regards the number of lights, but as regards the quantity of gas consumed. Our prospects, therefore, for the future, are assuring and encouraging. With these remarks I move the adoption of the report.

Major SUART seconded the motion.

Mr. STOKES: What was the rate of dividend this time last year?

The CHAIRMAN: The same as now; 3½ per cent.

Mr. PENNY: Your stock of coal appears very large. I have had some experience in hot climates, and know that coal depreciates there more or less, and I have also found that they heat and fire. May I ask whether you have suffered any inconvenience in that way?

The CHAIRMAN: You were not here just now when I said that we have suffered in two or three cases from the spontaneous combustion of English coal, which contains a good deal of iron pyrites. We have lost altogether nearly 400 tons in actual firing and heating of coal. We have therefore, for the present, almost entirely abandoned the practice of shipping coal from this country, and use Australian coal almost exclusively. We had one case of the firing of Australian coal, but there is no doubt whatever that it is far less liable to self-ignition than English coal. We are now putting Australian coals into the works at a low figure.

Mr. PENNY: I have no doubt that Mr. Stephenson's practical knowledge would teach him that the plan I have always adopted of working out old stocks, and not leaving coal in sheds for several years, is the right one. I take it, therefore, that your present stock consists of recent purchases.

Mr. STEPHENSON: When coals and freight are cheaper on this side than the other, we send out English coal, with instructions for it to be used as soon as possible. When coals and freight are low in Australia, we ship from there. The peculiarity of the Australian coals—especially that of one colliery, from which we have obtained large quantities—is, that they suffer little depreciation, and are not liable to fire. The disadvantage is, that the coke from that coal is not quite so good. It does not produce a spongy, swelling coke, as English does. But in the result for gas-making—in quantity of gas and illuminating power—it is quite as good.

The CHAIRMAN: It is a little better. The per centage of gas is better, but the English coal produces a better coke.

Mr. PENNY: I presume the course you adopt is to use the English coke in the furnaces?

The CHAIRMAN: Some part; as much as possible.

Mr. PENNY: As a shareholder, I am entirely satisfied with the report and with the doings of the directors, and I only ask these questions for information.

The CHAIRMAN: You are quite right. We are very glad to hear and reply to them.

The motion for the adoption of the report was then put and carried.

This being the whole of the business,

Mr. STOKES moved, and Mr. PENNY seconded, a vote of thanks to the chairman and directors, which was put and carried unanimously.

The CHAIRMAN: On my own behalf, and that of my co-directors, I beg to acknowledge your kindness in giving us this mark of your approval, and I hope we shall always continue to deserve it.

The proceedings then terminated.

BOLTON CORPORATION GAS DEPARTMENT.

ACCOUNTS FOR THE YEAR ENDING JUNE 30, 1877.

REVENUE ACCOUNT.

RECEIPTS.

Gas and meter rental—			
377,346,000 cubic feet of gas supplied to consumers during the year	£75,778 8 5		
One year's rent of meters	919 11 9		
	£76,698 0 2		
Less discounts allowed	£6,501 4 1		
Ditto bad debts	126 4 2		
	6,627 8 3		
		£70,070 11 11	
Residual products—			
Coke sold	£3,683 19 11		
Tar sold	3,392 6 11		
Spent lime sold	150 1 6		
Ammoniacal salts and liquor sold	3,368 15 5		
Old materials and sundries sold	36 11 3		
		10,631 15 0	
Fitting trade—			
Total of fittings and meters sold	£7,329 7 4		
Less cost of wages and materials, &c.	6,081 4 8		
Profit for the year		1,248 2 8	
Chief rents, &c.		112 17 11	
Miscellaneous receipts—Transfer fees		4 2 6	
Interest account—Bank interest allowed		230 18 1	
		£82,298 8 1	

PAYMENTS.

Gas manufacture—			
Carbonization.			
Cannel and coal consumed	£28,680 18 9		
Stokers wages	5,333 11 2		
		£34,014 9 11	
Purification.			
Lime	£856 0 4		
Wages of workmen	789 7 10		
		1,645 8 2	
Retorts, materials, and labour—			
Wages of workmen	£638 11 5		
Gas-retorts, fire-bricks, tiles, clay, &c.	779 6 8		
		1,417 18 1	
Repairs of works and services, &c.—			
Wages of workmen	£2,480 16 5		
Iron, steel, ironwork, brasswork, &c.	281 0 4		
Timber, woodwork, &c.	56 15 5		
Plumbing, &c.	25 6 4		
Paint, painting, white lead, tallow, oil, drysalteries	264 4 5		
Cement	11 9 6		
Repairs to road	2 17 0		
Ditto to telegraph apparatus	2 12 6		
Spun yarn, rope, waste, india-rubber tubing, &c.	38 7 3		
Stone, bricks, sand, and lime	43 2 7		
Boiler insurance	2 5 0		
Brushes, brooms, and sundries	35 11 0		
Naphtha	24 7 0		
Saddlery	15 3 0		
		3,283 17 9	
General expenses—			
Water-Works Committee, water used in the works	£185 5 3		
Yard labour, &c.	108 14 7		
Matches for stokers	9 0 0		
Compensation paid, *re* Lum Street accident, &c.	161 15 11		
Miscellaneous expenses	11 5 10		
		476 1 7	
Chief rents, &c.		143 12 3	
Salaries		2,002 7 10	
Meter inspection		731 14 4	
Office and miscellaneous expenses		514 5 2	
Rates and taxes		1,251 17 5	
Interest and annuities—			
Interest on loans, less income-tax	£3,532 19 0		
Bank commission charged	116 16 4		
One year's annuities	14,460 4 10		
		18,110 0 2	
Sinking-fund account—			
Amount transferred towards redemption of annuities and debt, being 1¼ per cent. on mortgage debt of £92,504	£1,156 6 0		
And 1-75th part of capitalized value of annuities at 25 years purchase	4,820 1 6		
		5,976 7 6	
District-rate account—			
Amount of profit transferred to Central district-fund	£5,850 0 0		
Ditto ditto transferred to Rumworth district-fund	150 0 0		
		6,000 0 0	
Renewal-fund account—			
Amount set apart to provide for renewal of works and plant, &c., being balance of profit for year 1876-7		6,730 7 11	
		£82,298 8 1	

RENEWAL-FUND ACCOUNT.

RECEIPTS.

Balance, June 30, 1876, as per last abstract	£5,068 2 4	
Revenue account—Amount transferred, being balance of profit, 1876-7	6,730 7 11	
	£11,798 10 3	

PAYMENTS.

Expenditure—			
Wages of workmen	£1,067 2 3		
Gasholder	1,053 0 0		
Bricks, stone, and walling	470 3 6		
Plumbing, glazing, &c.	396 7 7		
Timber	391 5 4		
Ironwork	306 5 1		
Valves	289 16 0		
Paving and flagging	181 16 2		
Slating	104 14 0		
Railway siding	92 9 0		
Painting	35 0 0		
Carts	20 0 0		
Lightning conductor and sundries	38 17 11		
		£4,446 16 10	
Balance, June 30, 1877		7,351 13 5	
		£11,798 10 3	

DEPOSIT-FUND ACCOUNT.

RECEIPTS.

Balance, June 30, 1876, as per last abstract	£4,828 6 0	
Amount received from sundry depositors as security for payment of gas-rent	1,933 17 6	
	£6,762 3 6	

PAYMENTS.

Deposits repaid—Amount returned to sundry depositors during the year	£1,399 14 6	
Balance, June 30, 1877	5,362 9 0	
	£6,762 3 6	

SINKING-FUND ACCOUNT.

RECEIPTS.

Balance, June 30, 1876, as per last abstract			£6,199 17 6
Revenue account—			
Amount transferred towards redemption of annuities and debt, being 1¼ per cent. on mortgage debt of £92,504	£1,156 6 0		
And 1-75th part of capitalized value of annuities at 25 years purchase	4,820 1 6		
		5,976 7 6	
		£12,176 5 0	

PAYMENTS.

Loans repaid	£3,512 0 0	
Balance, June 30, 1877	9,664 5 0	
	£12,176 5 0	

CAPITAL ACCOUNT.

RECEIPTS.

Balance, June 30, 1876, as per last abstract			£11,317 14 8
Loans received—			
For 5 years, at 3½ per cent.	£900 0 0		
„ 5 „ 4 „	2,500 0 0		
„ 7 „ 4 „	3,460 0 0		
„ 10 „ 4 „	22,450 0 0		
		29,250 0 0	
Extension of mains and services—Amount received for old metal sold		142 13 2	
		£40,710 7 10	

PAYMENTS.

Extension of works and plant—			
New purifying-house, boundary wall, &c.	£11,300 2 11		
New retort-bed	2,325 5 1		
Retort-house roof, Gas Street	1,512 0 0		
Condensers	1,392 0 0		
Purifiers	2,800 0 0		
Scrubbers	1,865 12 6		
Exhausters, engines, pumps, and gearing	672 16 7		
Sundry ironwork, valves, and pipes	717 10 10		
Boiler and fittings, travelling crane, &c.	835 2 0		
Paving, water-fittings, painting, and sundries	315 14 2		
Engineering expenses, chemical apparatus	118 0 0		
		£23,472 4 1	
Extension of mains and services—Cost of labour and materials in laying and extending mains and services		9,543 6 6	
New meters and stamping		1,905 4 1	
Balance, June 30, 1877—Being the difference between the floating assets and liabilities, as per stock account		5,789 13 2	
		£40,710 7 10	

STOCK ACCOUNT.

ASSETS.

Works and plant—			
As per last abstract	£264,632 15 5		
Increase due to capitalization of annuities	155,558 12 10		
Additions during the past year	34,778 1 0		
		£454,970 9 9	
Floating assets—			
Amount owing by sundry debtors, June 30, 1877	£16,237 2 9		
Stock of cannel and coal, ditto	1,730 0 0		
Ditto chemicals, ditto	54 0 0		
Ditto meters and fittings, ditto	5,017 0 5		
Bank of Bolton, balance in hand, ditto	12,451 10 3		
		35,489 13 5	
		£490,460 3 2	

LIABILITIES.

Capitalized value of annuities—			
Old shareholders capital, as per gas company's ledger			£305,947 10 1
Increase due to capitalization of annuities			155,558 12 10
Being 25 years purchase on £14,460 4s. 11d. gas annuities, as per sect. 126 of the Bolton Corporation Act, 1872			£361,506 2 11
Mortgages on credit of borough-fund—			
Falling due July 1, 1877	£17,800 0 0		
Ditto Jan. 1, 1879	1,400 0 0		
Ditto July 1, 1879	5,692 0 0		
Ditto Jan. 1, 1880	8,700 0 0		
Ditto Jan. 1, 1881	3,500 0 0		
Ditto Jan. 1, 1882	23,400 0 0		
Ditto Jan. 1, 1883	6,300 0 0		
Ditto Jan. 1, 1884	5,400 0 0		
Ditto Jan. 1, 1886	4,100 0 0		
Ditto Jan. 1, 1887	22,450 0 0		
		96,742 0 0	
Floating liabilities—			
Renewal-fund account	£7,351 13 5		
Deposit-fund ditto	5,362 9 0		
Sinking-fund ditto	9,664 5 0		
Central district-fund, proportion of profit	5,850 0 0		
Rumworth district-fund, ditto	150 0 0		
Amount owing to sundry other creditors	1,321 12 10		
		29,700 0 3	
Balance, excess of assets, being amount of mortgage debt extinguished through sinking-fund		2,512 0 0	
		£490,460 3 2	

[For Appendix to these accounts, see next page.]

BOLTON CORPORATION GAS DEPARTMENT (*continued*).

Comparative Statement of Revenue Account, with the Rate per Cent. of Profit, 1870 *to* 1877.

	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.
Receipts—	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Gas-rental	41,205 12 2	45,129 18 0	51,725 5 7	54,008 4 3	59,582 8 0	66,708 6 2	67,944 9 0	69,277 4 4
Meter-rental	103 11 2	194 19 2	288 8 10	391 13 8	507 6 0	624 17 1	761 0 11	919 11 9
Meters and fittings profits	1,360 5 10	1,409 19 6	1,384 2 5	2,176 16 7	1,325 1 0	1,332 4 3	1,535 5 1	1,243 5 7
Other receipts	5,423 15 1	6,654 2 1	7,478 14 5	13,395 2 10	13,092 17 4	12,332 10 4	10,790 14 9	10,858 17 2
Total	48,093 4 3	53,388 18 9	60,876 11 3	69,971 17 4	74,507 12 4	80,997 17 10	81,801 9 9	82,298 18 10
Expenditure—	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Gas manufacture	23,007 3 9	24,891 10 5	28,397 12 4	27,770 19 5	42,776 0 7	48,000 1 8	41,928 1 2	35,659 18 1
Repairs of works and retorts	5,222 14 0	7,638 14 10	7,721 12 6	6,040 4 10	6,710 17 8	4,489 7 8	5,269 2 0	4,701 15 10
Salaries	2,431 13 11	2,532 19 10	2,756 0 11	2,497 16 9	2,559 7 10	2,597 15 6	2,667 4 11	2,734 2 2
Rents, rates, and miscellaneous	3,674 19 5	3,767 1 1	5,121 16 10	2,327 13 5	2,813 3 1	3,083 7 6	2,806 7 5	2,503 3 6
Gross profit	13,756 13 2	14,558 12 7	16,879 8 8	31,335 2 11	19,648 3 2	22,827 5 6	28,360 14 3	36,699 19 3
Total	48,093 4 3	53,388 18 9	60,876 11 3	69,971 17 4	74,507 12 4	80,997 17 10	81,031 9 9	82,298 18 10
Appropriation of profit—	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Interest and annuities (old gas company's dividend)	12,758 12 4	13,729 3 11	14,335 16 2	15,658 2 5	15,614 15 11	16,554 13 1	17,024 14 1	17,993 3 10
Sinking-fund	—	—	—	—	—	696 0 0	5,503 17 6	5,976 7 6
Renewal or reserve fund	998 0 10	829 8 8	2,543 12 6	9,754 7 10	1,033 7 3	2,576 12 5	2,832 2 8	6,730 7 11
Net profit in aid of rates	—	—	—	5,922 12 8	3,000 0 0	3,000 0 0	3,000 0 0	6,000 0 0
Gross profit as above	13,756 13 2	14,558 12 7	16,879 8 8	31,335 2 11	19,648 3 2	22,827 5 6	28,360 14 3	36,699 19 3
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Rate per cent. of gross profit on the capital	8 7 10	8 7 9	9 1 11	9 1 3	5 3 6	5 13 9	6 18 7	8 14 8
Rate per cent. of net profit in aid of rates	—	—	—	4 14 3	0 15 9	0 14 11	0 14 8	1 8 6

Mem.—The gas-works became the property of the corporation, June 30, 1872.

Statistics as to Gas Manufacture.—Leakage and Price per 1000 *Cubic Feet,* 1870 *to* 1877.

Year.	Tons of Coal and Cannel Carbonized.	Average Cost per Ton.	Cubic Feet of Gas Made.	Cubic Feet of Gas Sold.	Loss.		Average Feet per Ton Made.	Net Gas-rental.	Net Price per 1000 Cubic Feet if Paid within Twenty-one Days.			
					In Cubic Feet.	Per Cent.			Within the Borough.	Within Two Miles radius.	Outside Townships.	Horwich and Chapeltown.
		£ s. d.							s. d.	s. d.	s. d.	s. d.
1870	24,519	0 15 8	273,571,000	240,852,000	32,719,000	11·95	11,157	41,205 12 2	3 4	—	3 10	4 4
1871	27,425	0 15 1	303,209,000	264,672,000	38,537,000	12·70	11,055	45,129 18 0	3 4	—	3 10	4 4
1872	31,687	0 14 9	338,024,000	304,585,000	33,439,000	9·89	10,667	51,725 5 7	3 4	—	3 10	4 4
1873	33,259	0 13 5	359,102,000	319,909,000	39,193,000	10·91	10,797	54,008 4 3	—	3 4	3 10	4 4
1874	35,053	1 0 10	377,517,000	333,771,000	43,746,000	11·58	10,769	59,582 8 0	—	3 9	4 3	4 6
1875	37,865	1 1 10	397,610,000	352,612,000	44,998,000	11·31	10,500	66,708 6 2	—	3 9	4 3	4 6
1876	38,621	0 18 1	404,422,000	360,447,000	43,975,000	10·87	10,471	67,944 9 0	—	3 9	4 3	4 6
1877	38,929	0 14 8	420,836,000	380,637,000	40,199,000	9·54	10,810	69,277 4 4	—	3 6	4 0	4 3

Mem.—A reduction of 2d. per 1000 cubic feet in the price of gas is authorized to take effect from Jan. 1, 1878.

COMMERCIAL GAS COMPANY.

At the last Meeting of the Mile End Old Town Vestry,

Mr. Pollard inquired of Mr. Jones (Metropolitan Board) whether he could give any information as to the cause of the excess of ammonia for which the Commercial Gas Company were recently prosecuted by the Metropolitan Board of Works.

Mr. Jones explained the present position of the law regulating the illuminating power and purity of the gas supplied by the Commercial Gas Company; and then passed on to say that the impurity for which the company were fined was a maximum excess of 3½ grains in 100 cubic feet of gas. This excess was attributable entirely and solely to accident beyond the foresight and control of the company's servants; and it was one of those misadventures to which all manufactures were sometimes liable. When the ammonia escaped on the 14th of September, the pure gas would gradually take it up—absorb it, in fact—so that it took several days to eradicate it. The quantity of ammonia was so small as to make its perception almost a myth, it was undiscoverable except by the aid of delicate chemical tests. Every professional chemist conceded that the contamination, on the occasion in question, was not of any real consequence, arising, as it did, from the purest accident, but there was no doubt that, technically, the company were responsible. Still the company had reason to complain of the Metropolitan Board having altogether omitted to give the proper notice, under the 37th section, whereby the company were deceived as to the necessity for appealing. If they had appealed they could not have been other than successful. He reiterated his assurance that the impurity, though due to an unforeseen accident, was practically very slight; the quantity of ammonia present in the gas being far exceeded by that carried in a lady's smelling-bottle. It must be manifest to every one that, quite apart from the company's desire to supply pure gas, they would not wilfully neglect to extract every atom of ammonia from the gas, seeing that ammonia was a marketable commodity of value, and one from the sale of which the company derived considerable receipts. Had the company been able to save money by allowing the ammonia to escape into the mains there might be grounds for suspicion that they were seeking thus to increase their profits, but it was manifest that exactly the contrary was the fact. In every way it was to the interest of the company—whether for shareholders or consumers—to prevent impurity in the gas supplied, as far as possible. He emphatically repeated that the impurity of the 14th of September, insignificant as it was, was absolutely and entirely the result of accident; and every care, in the best interest of the company, not less than in that of the consumers, was being exercised to provide against any repetition of the technical offence. The company, not having received the proper notice, and, as a consequence, not having appealed, were debarred from going into the merits of the case before the magistrate. They were thus tied hand and foot, and the Metropolitan Board of Works had it all their own way. The company were, therefore, fined on a technicality which could not be considered otherwise than as exceedingly harsh. Under these circumstances, it was very much like hitting a man when he was down. Again assuring the vestry that the consumers suffered no injury by what had occurred, he begged to thank them for their patience in listening to his explanation.

Mr. Pollard thanked Mr. Jones for his full explanation, which he thought would be very satisfactory, not only to the vestry, but to the customers of the company.

Ruthin Water Company.—We are glad to learn that this company are taking active steps to carry out the objects of the Provisional Order recently granted by the Board of Trade and confirmed by Parliament. All the preference shares have been taken up, and the directors have engaged the services of Mr. Lloyd Williams, of Denbigh, as their engineer. This gentleman is now engaged in the preparation of working plans, &c., of the additional reservoir and filter-beds. The directors have also decided on extending the main-pipes throughout the town. This part of the work is to be carried out under the superintendence of Mr. David Jones, the secretary and manager, and arrangements are being made to proceed with as little delay as possible. The dividend of 5 per cent., declared at the last half-yearly meeting on the ordinary shares, has been paid.

Rivers Pollution Prevention Act.—The third inquiry, under the 12th section of this Act, was opened on Friday last at the Town-Hall, Barnet, by Mr. R. Rawlinson. The Local Board of Barnet have been put to great expense for some time past through legal proceedings which have been successfully brought against them at the Hertford Assizes, and in the Chancery Division of the High Court of Justice, for the pollution of a stream known as Dallas Brook, with sewage from their sewage outfall works. A short time ago they applied for a certificate, under the 12th section of the Rivers Pollution Act, and the present inquiry was for the purpose of ascertaining the circumstances of the case, and of deciding as to the granting of the certificate. After some discussion, the inquiry was adjourned. At Canterbury and Sandown, the only other places where inquiries under the 12th section of the Act have been held, no certificates have been granted.

Gas-Lit Railway Carriages.—An experiment, the final result of which must prove of great interest, was recently made on the line between Melbourne and Ballarat, with gas as an illuminator instead of oil. A saloon carriage, fitted with four Argand or ring-shaped burners, in place of the ordinary kerosene lamps, was added to the evening train, which left Melbourne at 7 p.m. Gas was generated from benzol, stored in a box-shaped copper vessel, which was hung from the under part of the floor of the carriage. A liquid of an inflammable nature like benzol, of course, needs to be carefully handled, but the reservoir in which it was stored, and the manner in which it was operated on, rendered it perfectly harmless. A current of air was sent, by the agency of a fan placed in the guard's van, through a long tube to the copper vessel under the carriage, where it was brought into contact with the surface of a cloth, which the oil kept constantly moist. By contact with the cloth it got saturated with benzol, and by the time it reached the jets it was in a fit state to burn brightly. A 2-inch tube was employed to convey the air to the jets. The vibration of the carriage, which was considerable on the rough road between Melbourne and Geelong, made the flame jump a good deal, but this undesired motion, it was expected, could be removed by placing the reservoir in a horizontal, instead of a perpendicular position, for the incessant shocks given to the reservoir, and transmitted thence to the air in the tubes, were the cause of the jumps. A light of considerable brilliance was given by the gas, which was estimated by Mr. Dempster at 24 candles, and the improvement upon the ordinary kerosene lamp was unmistakable. Attention was drawn to a needed change in the reflector over the burner. As travellers know, the lamplight in trains is not diffused, but somewhat concentrated, so as to produce a luminous spot on the floor. A convex reflector, which will scatter the light in all directions, will, no doubt,

be at once substituted for one in the form of an inverted saucer. Reflectors, as they have hitherto been used, collect the rays into a narrow vertical stream, and persons seated on the cushions at the side of saloon carriages find it difficult to read even a time-table; but the passenger immediately under the lamp has a strong glare on his book. The gas is not only much more brilliant than oil, but it admits of the use of a very simple form of burner, and it was noticeable, in a comparison of the oil and gas apparatus last night, that very little light was cut off, in the case of the gas, by brasswork under the flame. Moreover, chimneys of less size could be used in the case of the gas than in the case of the oil, which was an important consideration, for a large chimney meant a reflector of reduced surface. Each burner was supposed to consume 3 feet of gas, and the copper box contained enough oil to last for two or three weeks. Gas does away with a great deal of lamp-cleaning, and also with the labour of taking lamps out and putting them back again daily. Each jet was protected by a bell glass hung upside down. On the New South Wales Railways coal gas is burned, and it is carried in small reservoirs, filled at the commencement of the journey. The present is the first successful attempt which has been made, at any rate in Australia, to generate gas in the train, and the invention seems full of promise. The trial was made in the presence of the Minister of Railways, who went as far as Geelong (accompanied by the assistant traffic manager and Mr. Dempster), and returned by the Ballarat train.—*Melbourne Argus, Aug.* 4.

Register of New Patents.

APPLICATIONS FOR LETTERS PATENT.

4297.—Tylor, J. J. and W. A., Newgate Street, London, "Improvements in apparatus and arrangements for regulating, controlling, and arresting the flow of liquids and fluids." Nov. 16, 1877.

4309.—Robertson, S., Old Broad Street, London, "Improvements in slide valves and cocks." Nov. 17, 1877.

4323.—Pieper, C., Dresden and Berlin, "Improvements in the apparatuses for the purification of coal gas." A communication. Nov. 19, 1877.

4332.—Forbes, J., and Abbott, J., Old Ford, London, "Improvements in apparatus used in the distillation of coal for the production of coke, tar, and ammoniacal liquor, and the utilization of the resulting gases." Nov. 19, 1877.

4342.—Ashworth, G. K., Halifax, Yorks, "Improvements in the method of and apparatus for coupling pipes." Nov. 20, 1877.

4346.—Stephan, J. A., Worcester, "Improvements in the manufacture of carburetted hydrogen and oxyhydrogen gases." Nov. 20, 1877.

4370.—Cornelius, G. F., Merton Abbey, Surrey, "Improvements in the treatment of hydrocarbon oils for the manufacture of gas and of oil for lubricating and other purposes." Nov. 21, 1877.

4398.—Schülke, J., Berlin, "Improvements in dry gas-meters." Nov. 22, 1877.

PATENTS WHICH HAVE PASSED THE GREAT SEAL.

2024.—Day, J. J., Kentish Town, London, "Certain improvements in the construction of ball vales." May 24, 1877.

2069.—Brett, R. W., Hertford, "Improvements in lanterns for public or private lighting, and in the mode of supporting the same." May 28, 1877.

2128.—Burt, P., Glasgow, "Improvements in the arrangement or construction of double-acting steam-pumps." June 1, 1877.

3191.—Robbins, J., Bartholomew Road, London, "An improved joint for water and other pipes." Aug. 22, 1877.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

3882.—Parkman, E., "Improved means to be applied to lamps or lanterns to indicate the names of streets or other information, which means will also assist in reflecting the light from such lamps or lanterns." Nov. 11, 1874.

3908.—Valentin, W. G., "Improvements in the treatment of spent oxide of iron for the purpose of extracting cyanogen compounds therefrom." Nov. 12, 1874.

3928.—Richards, W., "Improvements in instruments for measuring fluids." Nov. 14, 1874.

3955.—Hallam, S., and Lamb, J. W., "Improvements in the fittings for glass water-gauges." Nov. 17, 1874.

3960.—Hulme, R., and Lund, E. jun., "Improvements in pumps." Nov. 17, 1874.

PATENTS WHICH HAVE BECOME VOID.

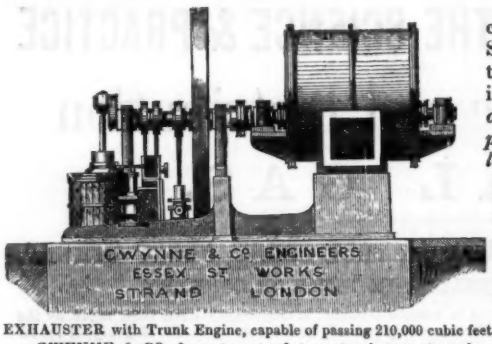
BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £100 BEFORE THE EXPIRATION OF THE SEVENTH YEAR.

2972.—Pearn, R. P. and F. K., "Improvements in machinery for raising and forcing fluids." Nov. 12, 1870.

3000.—Lyon, H., "Improvements in apparatus for weighing and measuring quantities and registering the same." Nov. 16, 1870.

The GRAND MEDAL of MERIT at the VIENNA EXHIBITION, and TWO MEDALS at the PHILADELPHIA EXHIBITION have been AWARDED to GWYNNE & CO. for GAS-EXHAUSTERS, ENGINES, and PUMPS; Also 27 OTHER MEDALS AWARDED at all the GREAT INTERNATIONAL EXHIBITIONS.

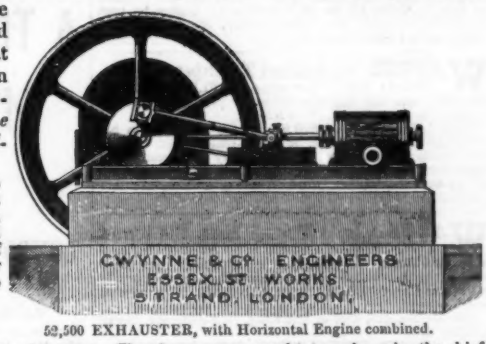
GWYNNE & BEALE'S PATENT GAS-EXHAUSTERS & ENGINES.



EXHAUSTER with Trunk Engine, capable of passing 210,000 cubic feet per hour.

The Judges report on the combined Exhauster and Steam-Engine exhibited at the Philadelphia Exhibition is—"*Reliable compact Machine, well adapted for the purpose intended, of excellent workmanship.*"

GWYNNE & CO. have made the largest and most perfect Gas-Exhausting Machinery in the world, and have completed Exhausters to the extent of 7,000,000 cubic feet passed per hour, of all sizes from 2000 to 210,000 cubic feet per hour.



52,500 EXHAUSTER, with Horizontal Engine combined.

GWYNNE & CO. do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, *but to produce machinery of the very highest quality, and most approved design and workmanship.* The result is that in every instance their work is giving the fullest satisfaction. Numerous testimonials and references can be given to Companies using their Machinery for years past.

Exhausters, with or without Engines combined, can be made to pass the gas without oscillation or variation in pressure. Regulators, Bye-Passes, Stop-Valves, Gas-Valves, Station Governors, and Gas Machinery of all Sizes.

PLEASE ADDRESS IN FULL, GWYNNE & CO., Hydraulic and Gas Engineers, ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON, W.C., ENGLAND.

☞ *G. & Co. are now making 6 Sets Exhausters and Engines for 105,000 cubic feet per hour, 3 Sets 180,000 Exhausters and Engines, with many others of all Sizes.*

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Beg to announce that they have REMOVED to their New Premises,

TAY WORKS, BONNINGTON, EDINBURGH,

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May 30, 1877.

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GAS MANAGER'S HANDBOOK.

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11, BOLT COURT, FLEET STREET, LONDON, E.C.

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.

Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

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GAS MANAGER.

WANTED, a practical Man to undertake the sole management of a small Gas-Works. Will have to collect gas-rents, and attend to the coal trade.

Address, with testimonials, stating salary required, Mr. W. ROBINSON, Sedbergh, YORKSHIRE.

WANTED, Orders for Samples to test the superior Silkstone, Wigan, and other Gas Coals and Cannel on Sale by G. J. EVESON, Gas Coal and Cannel Contractor, BIRMINGHAM.

N.B.—Prices on personal application, or by post or telegram, on shortest notice, and prompt delivery.

WANTED, a respectable man as Gas-FITTER for interior and exterior work. Must be a man of experience, and have a knowledge of service laying. Wages, according to ability, from 24s. to 28s. per week.

Apply, by letter, addressed No. 420, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by the Leigh Local Board, Leigh, Lancs, a DRAUGHTSMAN. One who is capable of taking out quantities and preparing specifications.

Applications, with testimonials, stating salary required, to be addressed to J. TIMMINS, Engineer, Gas and Water Department.

WANTED, by the Leigh Local Board, Leigh, Lancs, a PLUMBER and GASFITTER. Preference will be given to one having a knowledge of water-meters.

Applications and references to be addressed to the undersigned, stating wages expected, J. TIMMINS, Engineer, Gas and Water Department.

WARRENPOINT GAS-WORKS.

WANTED, Two New or Second-hand PURIFIERS, 8 ft. by 6 ft., with lifting gear, sieves, 4 in. connections, and centre-valve to work either one or both as required.

Tenders, with full particulars, to be sent to the MANAGER, Gas-Works, Newry, IRELAND.

WANTED, a re-engagement as Gas-Meter INSPECTOR and COLLECTOR, or General Distributing Inspector. Thoroughly competent, from practical experience, to superintend the testing, repairing, and fixing wet and dry meters, main and service laying, gas-fitting, &c. Good testimonials.

Address G. M. J., at Wilson and Co.'s, 103, Cheapside, LONDON, E.C.

WANTED, the Address of Gas Companies who have not received a Copy of the New Edition of PAMPHLET for GAS COMPANIES to distribute to their Gas Consumers—"Cooking and Heating by Gas." Price £6 for first thousand. Copies by post Threepence—direct from the Author, MAGNUS OHREN, Gas-Works, SYDENHAM, S.E.

WANTED, by Samuel Thompson & Co., Colliery Office, Lancaster, APPLICATION for PRICES from Gas Managers who are prepared to receive Tenders for GAS COAL or CANNEL.

John Leigh, Esq., M.R.C.S., F.C.S., &c., &c., in his analytical report of S. T. & Co.'s Coal, says: "It is remarkable for its purity, I have scarcely ever examined a Coal containing so small a quantity of ash, and when Cannel of the best description is scarce, it may well replace this material."

WANTED, by a Young Man, the son of a Gas Engineer, a situation as ASSISTANT in a large Gas-Work, or as Manager of a smaller one. Is a good draughtsman, has a knowledge of chemistry, and is quite competent to take charge of a work. Can be well recommended.

Address No. 415, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Working Manager for a small Gas-Works, making about 3 million cubic feet per year. Must understand carbonizing, fitting, and main laying, and be able to drive a small engine for pumping water. A night stoker will assist during the winter months.

Applications, stating qualifications, age, and where previously employed, to be sent in candidate's own handwriting, stating wages required, to Mr. CHARLES TOMLISON, Hadley House, Rotherham, YORKSHIRE.

One who is also a plumber preferred.

ON SALE—One Station-Meter, to pass 1000 cubic feet per hour. Almost new. Will be sold cheap.

Apply to J. HALL, Gas-Works, St. Helen's, LANCS.

SHOTLEY BRIDGE AND CONSETT DISTRICT GAS COMPANY.

TAR FOR SALE.

THE Directors of the above Company are prepared to receive TENDERS for the TAR produced at their works for Twelve months, or such other term as may be agreed on, from Jan. 1, 1878.

The quantity at present made is about 35,000 gallons per annum.

Tenders, marked "Tar," to be sent to the undersigned not later than the 5th of December.

Any further information may be had on application.

By order.

M. RICHLEY, Secretary.

Nov. 8, 1877.

GAS PLANT FOR SALE, suitable for Small Works:—

Seventeen 4-inch and 3-inch H-Pipes.
Eighteen 15-inch Circular Mouthpieces.
A 6-inch Governor.
A Station-Meter, to pass 6000 cubic feet per hour.
Scrubber and Washer combined; very good.
Vertical Condenser; very good.
Seven 7-feet lengths, 12-inch D-shaped Hydraulic Main.
Two Gasholders, each capable of holding 15,000 cubic feet.

Apply to the ENGINEER, Phœnix Gas Company, GREENWICH.

GAS PLANT FOR SALE.

FOUR Purifiers, 10 ft. square, with centre valve, 10-in. connections, and lifting apparatus complete, all in good working order, the removal of which is required for extensions.

Apply to the ENGINEER Gas and Water Works, BIRKENHEAD.

GAS AND WATER WORKS TO BE LET.

TO BE LET ON LEASE, for a term of years, the Milford Haven Gas and Water Works, Pembrokeshire.

The Works are fitted up with every requisite, and are in full operation.

Possession may be had on the 31st of December next, when the present Lessee's term expires.

Apply to the CLERK of the Milford Improvement Commissioners, Commissioners Offices, MILFORD HAVEN.

TO GASHOLDER MAKERS.

THE Directors of the Malton Gaslight and Coke Company invite TENDERS for the construction of the INNER LIFT of a Telescopic Gasholder, 82 ft. diameter by 20½ ft. deep.

Drawings and specifications may be seen at the Company's Offices, Malton, Yorkshire.

Tenders to be sent in on or before the 6th day of December, 1877, addressed to the Chairman and Directors of the Company, and endorsed "Tender for Gasholder."

The Directors do not bind themselves to accept the lowest or any tender.

HENRY TOBEY, Manager.

Malton, Nov. 15, 1877.

GAS PLANT AND 15-TON HAND CRANE FOR SALE.

THE Trustees for the District and Har-bour of Maryport have FOR SALE the following ARTICLES, lately used at the old Gas-Works, which were recently purchased by the Trustees, namely—

D-shaped Hydraulic Main, 1 ft. 6 in. by 1 ft. 6 in.
Fourteen 6-in. Ascension Pipes, with arch pipes all complete.
Fourteen Mouthpieces, 23 in. by 15 in.
Four Doors and Frames.
One Set of Condensers, 36 pipes, 7-in. inlet and 7-in. outlet.
One 4000-light Meter (makers, W. & B. Cowan, Edinburgh) with 6-in. connecting bye-pass valves, gauge, clock, and tell-tale, all in good order, equal to new.
Two Governors, 6-in. inlet and 6-in. outlet, all complete.
And also a 15 ton Hand Crane complete.

Offers to be sent to the undersigned on or before the 29th of December next.

JOHN BARWISE, Clerk to the Trustees.

Harbour Office, Maryport,
Nov. 21, 1877.

TO CHEMICAL MANUFACTURERS, TAR DISTILLERS, & OTHERS.
TENDERS FOR TAR AND LIQUOR.

THE Directors of the Shipley Gaslight Company are prepared to receive TENDERS for the purchase of their surplus TAR and AMMONIACAL LIQUOR for One year, from the 1st of January, 1878.

The Company will load, f.o.b. the Leeds and Liverpool Canal at Shipley, or into the contractor's carts on the Works.

The quantity of Coal carbonized in twelve months is 8000 tons.

Any further particulars may be obtained on application to the Secretary.

Sealed tenders to be sent in (stating separately price per ton for Tar and Liquor, endorsed "Tender for Tar, &c.") on or before the 8th of December, 1877.

JNO. WILCOCK, Secretary.

Gas-Works, Shipley, Nov. 14, 1877.

TO GAS COMPANIES.

WE beg to call attention to our Im-PROVED STREET-LAMP REGULATORS with brass cones and burners. Sample, 3s.; carriage paid. Special Steatite Burners for Street-Lamps, 8s. per gross. Quotations for quantities. Street-Lamp Regulators, Wet and Dry Meters repaired.

Messrs. TINDALL AND TELLING, Gas Apparatus Works, 74, Wynford Road, Penton Street, LONDON, N.

FOR SALE,

6000 TONS OF PURE NATURAL

"HYDRATED PEROXIDE OF IRON"

For GAS PURIFICATION.

For price and particulars apply, by letter, to No. 421, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

Mr. ROBERT DEMPSTER, Sen.,

CONSULTING GAS ENGINEER,

Of Messrs. Robert Dempster and Sons, Rose Mount Gas Engineering Works,

ELLAND, near HALIFAX,

May be consulted on all matters connected with Valuations, Arbitrations, and Parliamentary Applications connected with Gas-Works. Our R. D., Sen., having been engaged on extensive Arbitration Cases, which, combined with his experience in Construction and Contracting, his knowledge of Engineering and Valuations, is both extensive and reliable.

Now ready, price One Shilling, No. 12 *(to be continued Monthly) of*

A TREATISE ON THE SCIENCE & PRACTICE

OF THE

Manufacture and Distribution

OF

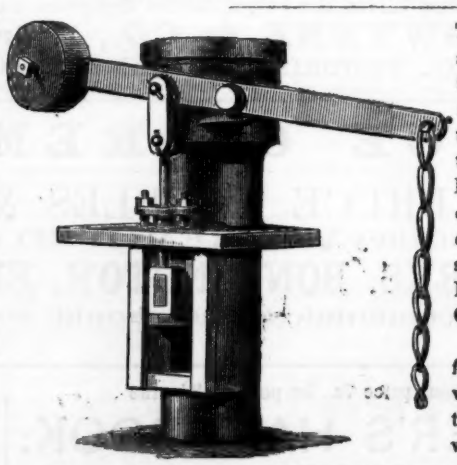
COAL GAS.

LONDON: WILLIAM B. KING, 11, BOLT COURT, FLEET STREET,

OR OF ANY BOOKSELLER IN TOWN OR COUNTRY.

For the convenience of persons resident in remote districts, arrangements have been made by the Publisher to forward the "Treatise" by Post, securely packed, at the cost of 1s. 2d. Monthly, or 7s. for the Half Year.

MOORE'S PATENT DIP-PIPE.



THE advantages of this Dip will be seen from the engraving. It is thoroughly effectual in its working, removing the whole of the pressure of the hydraulic main from the retort, thus causing a great saving in gas. It is very easy of manipulation, requiring little care and attention; it cannot get out of order, and, when shut, works as an ordinary Dip-Pipe. No accumulation of carbon in retort. Can be fixed to existing H-pipes.

In ordering the Dip, the distance from top side of hydraulic main to water-level should be stated; also the Dip at which it is required to work when the valve is shut.

PRICES—3-in., 35s.; 4-in., 42s.; 5-in., 48s.

SOLE AGENT: J. GILL, GAS-WORKS, BRIDGENORTH,

To whom all communications should be addressed.

MAKERS: THE COALBROOKDALE COMPANY, SHROPSHIRE.

NOTICE.

THE GAS & WATER COMPANIES DIRECTORY, 1878.

(WATER SECTION.)

The Editor will feel greatly obliged if Secretaries and Engineers would fill up, and return to him at once, the forms sent them, as the work is now going to press. If any have not received Forms, they will be forwarded immediately, on application to the Editor,

CHARLES W. HASTINGS,
8, BUCKINGHAM STREET, ADELPHI, LONDON, W.C.

E. & W. H. HALEY,

General Ironfounders and Makers
OF
CAST-IRON GAS AND WATER PIPES.
Sizes 1¼ to 15 inches.

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THE THAMES BANK IRON COMPANY,

(Successors to LYNCH WHITE,)
SUPPLY FROM STOCK
CAST-IRON RETORTS, SOCKET-PIPES for GAS or WATER PURPOSES, FLANGE-PIPES for STEAM, RAIN-WATER PIPES and GUTTERS, HOT-WATER PIPES and BOILERS, and all requisite Connexions for same; also LAMP-COLUMNS, LAMPS, WROUGHT FRAMES, WROUGHT-IRON TUBING, &c., &c.
All kinds of Gas-Works Apparatus and General Castings made to Pattern or Drawing.

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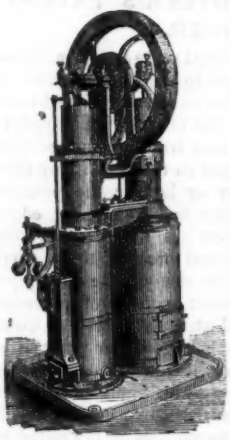
ATLAS METER-WORKS, OLDHAM,
MANUFACTURERS OF
WET AND DRY GAS-METERS,
STATION-METERS, GOVERNORS,
PRESSURE AND EXHAUST REGISTERS,
LAMP-METERS IN CAST-IRON BOXES,
And every Description of Gas Apparatus.



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ENGINEERS,
84 & 85, WHITECROSS STREET, LONDON,
MAKERS OF
RIDER'S PATENT
HOT AIR ENGINE.
AWARDED THE SILVER MEDAL AT THE MEETING
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ROYAL AGRICULTURAL SOCIETY AT BIRMINGHAM, 1876,
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HIGHEST HONOUR AT THE CENTENNIAL EXHIBITION.

COMBINES
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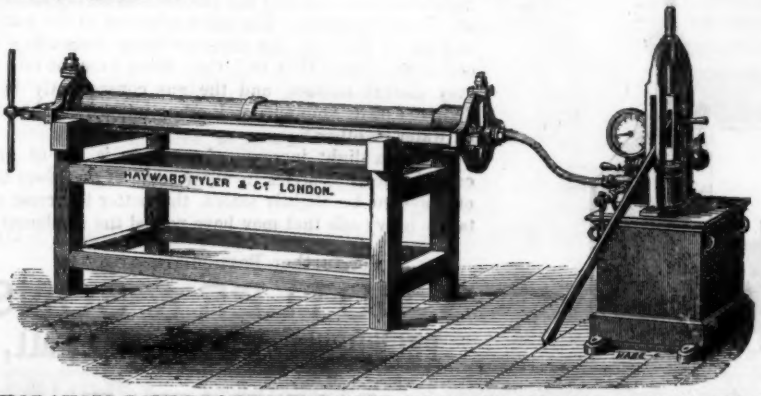

HYDRAULIC PIPE-PROVER FOR TESTING PIPES OF SMALL DIAMETERS.

A GUIDE TO GAS LIGHTING, by ALFRED H. WOOD, A.I.C.E., Gas Engineer, Hastings. "Full of sound, practical instruction for consumers, and is *an excellent book for Companies to circulate among their consumers.*"—JOURNAL OF GAS LIGHTING, &c.
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MICHAEL & WILL'S GAS AND WATER SUPPLY.

This day is published, second edition, 8vo., 25s., cloth,
THE LAW RELATING TO GAS AND WATER: comprising the Rights and Duties, as well of Local Authorities as of Private Companies, in regard thereto, and including all Legislation to the close of the last Session of Parliament. Second Edition. By W. H. MICHAEL and J. SHIRESS WILL, of the Middle Temple, Esqs., Barristers-at-Law.
London: BUTTERWORTHS, 7, FLEET STREET, Her Majesty's Law Publishers.

REMOVAL.
CHARLES HEISCH, F.C.S., Analytical and Consulting Chemist, Superintending Gas Examiner to the Corporation of London, &c., &c., has REMOVED from 8, Savage Gardens, to 79, MARK LANE, where he may be consulted as usual.

PARIS EXHIBITION, 1878.
MM. SERVIER, MONNIER, ROUGET, Engineers, specially in connection with the industry of Gas Lighting, will undertake to represent any Manufacturers who may be Exhibiting Goods in Classes 27 and 53.
References in France and England.
OFFICE: 18, RUE DE MAUBEUGE, PARIS.

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HILL and CO., Gas Engineers and Architects, 11, Appach Road, BRIXTON RISE, S.W., prepare Designs for the construction of New Gas-Works, Bridges, and Roofs, or for the remodelling and extension of existing Works. Also provide Drawings of all kinds of Gas Apparatus and Plant. Drawings, Tracings, and Specifications copied for Engineers and Contractors.

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CONSULTING GAS ENGINEER,
BARTON HOUSE, opposite BARTON ARCADE,
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SPECIAL ACCOUNTANT FOR GAS COMPANIES,
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Accounts analyzed and Statistics Prepared for Parliamentary Proceedings, Arbitrations, &c.
The Forms of Account, which have been specially designed by A. L. to meet the requirements of the Gas-Works Clauses Amendment Act, 1871, are now in use by many Gas Companies, and have been universally approved.
The above forms are registered.
Water Companies Accounts also prepared and adjusted.
CONSULTATIONS.

JOHN ROMANS, C.E., F.G.S.E.,
CONSULTING GAS ENGINEER
AND
CANNEL COAL FACTOR,
30, St. Andrew Square, EDINBURGH.

Plans and Estimates furnished; Gas-Works, Apparatus, Pipes, Machinery, Fire Goods, &c., supplied, or Attested and Shipped for Exportation.
GAS-WORKS TAKEN ON LEASE.

Mr. ROMANS has for upwards of 30 years been practically engaged in the Manufacture of Gas, and has, by extensive experiments, ascertained that by JUDICIOUS INTER-MIXTURE of the lighter with the heavier gases, much of the rich Hydrocarbons CAN BE SAVED, which otherwise ARE LOST, during the process of manufacture. He is therefore enabled to give advice to those who favour him with their orders for Cannel, as to the class which will secure for their standard of illuminating power the HIGHEST ADVANTAGEOUS RESULTS.

ANALYSIS AND PRICES FORWARDED ON APPLICATION.

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MANUFACTURERS OF
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Also Makers of all kinds of Common Building Bricks, and of Pressed White and Red Bricks for Facing.

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BEST GLASS-HOUSE POT and CRUCIBLE CLAY.
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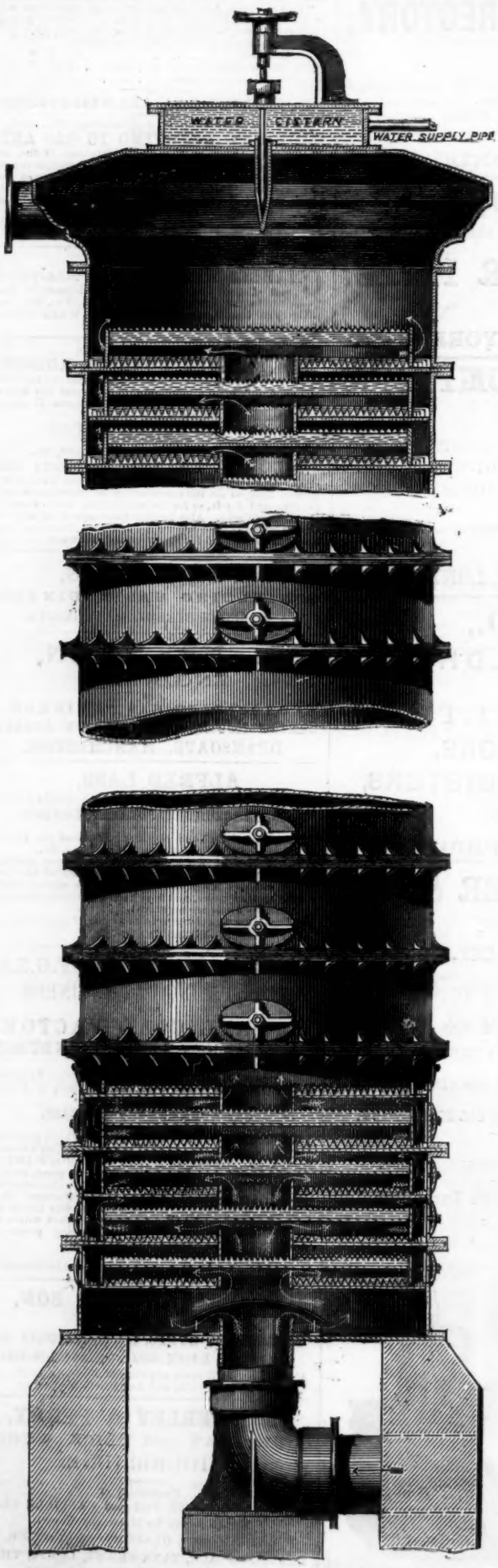
BLAST-FURNACE, TANK BRICKS, LUMPS, TILES,
And Every Description of Best Fire-Bricks.



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CONTRACTORS FOR GAS & WATER WORKS,
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MANUFACTURERS OF

Gasholders, Tanks, Purifiers,

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BRIDGES, BOILERS, AND GENERAL CAST AND WROUGHT IRON WORK.

S. C. & Sons undertake the entire Erection of New, or Remodelling of existing Gas-Works in any part of the World, including small Works for MANSIONS, FACTORIES, &c., or Works of the largest extent (are now constructing the largest Gasholder yet erected); also the Supplying and Laying of MAINS.

They make a speciality of supplying every requisite whatever for a Gas-Work, keeping in Stock what are most in request. WOOD SIEVES for Purifiers and Scrubbers, of a superior make.

SPECIAL CASTINGS to Drawing or Pattern at Shortest Notice.

MANUFACTURERS OF

CUTLER'S

PATENT GAS-WASHER

AND

MORRIS & CUTLER'S

PATENT CONDENSER.

(For Illustration and Description, see "Journal" for Nov. 13, page 768.)

DESCRIPTION OF CUTLER'S PATENT GAS-WASHER.

The Washer consists of a vessel or tower of a cylindrical or other form, convenient to the site available for it. The interior is fitted with a number of dished trays arranged as shown, one above the other, from bottom to top. The flanges or sides of these trays are formed with serrated edges, and are arranged so that each tray contains a certain depth of water or liquor; the position and size of the serrated orifices in the dipping edges being such that the upper parts are slightly above the water, and so that the combined area of these small orifices is proportionate to the size of the inlet-pipe, the gas passing through without increase of pressure, and diffused in thinly divided streams. All the other edges are likewise serrated, so that the liquor passes over same in small streams, and so that the gas cannot pass through in bulk. The water or washing liquor is admitted at the top, the supply being governed by a conical needle regulating-valve so that the amount can be regulated to any desired quantity. The gas is admitted at the bottom and out at the top, the water or liquor descending the one meeting the other, and thus being brought into the very closest contact, and the gas consequently being deprived of its ammonia and other impurities absorbed by water or other liquor.

Where a slight increase of pressure is not of great consequence, we prefer to allow some of the lower tiers of trays to be slightly sealed, the better to arrest any tar or heavy oils that may have passed the condenser.

For further Particulars, apply to

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PROVIDENCE WORKS, MILLWALL,

(NEAR THE STEAMBOAT PIER,)

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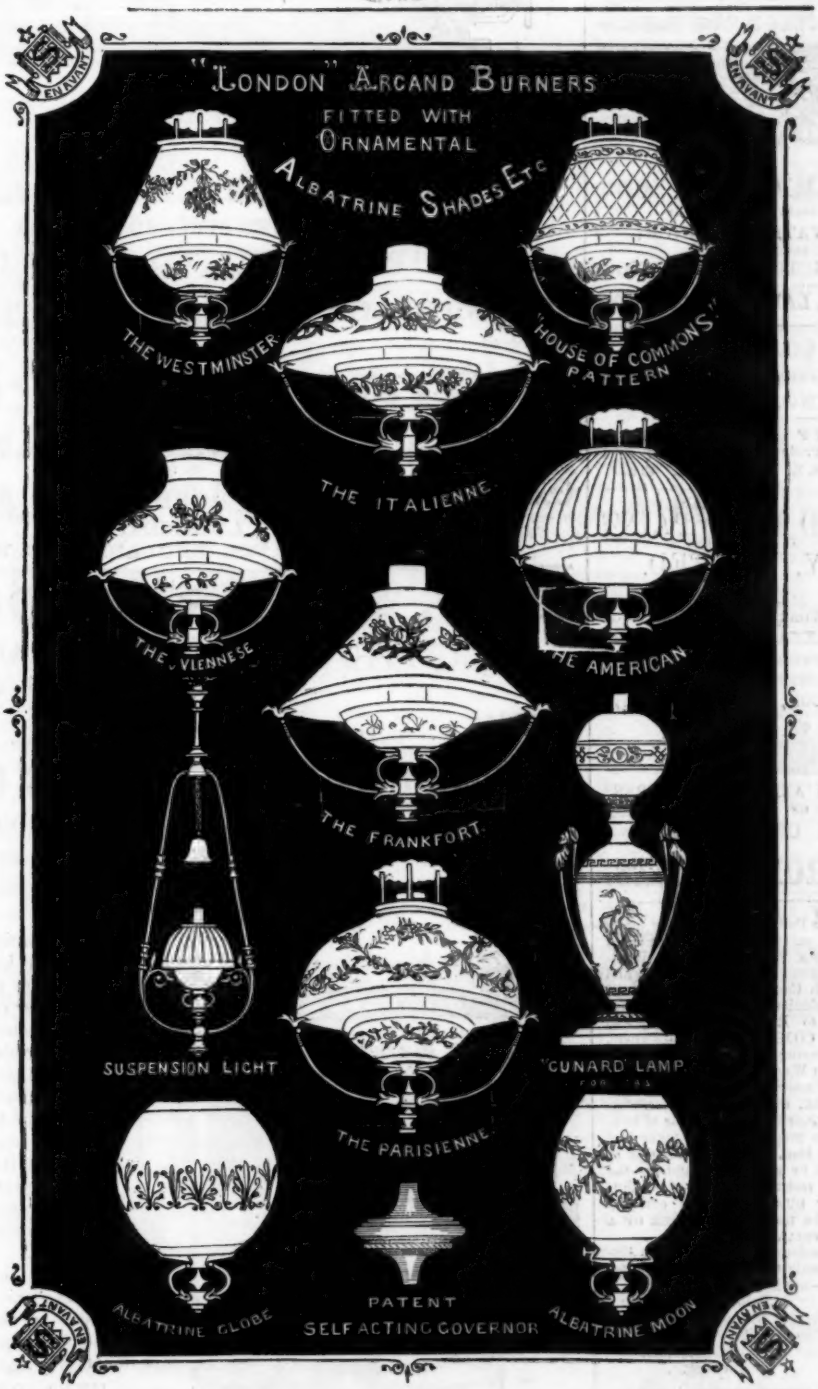
WILLIAM SUGG'S PATENT GAS BURNERS.

PARIS, 1867. LONDON, 1862.

"The Patent 'London' Argand Burner is adopted by the Gas Referees as the Standard Burner for London."—*Vide Gas Referees Report, May* 3, 1869.

"The very best Burner yet constructed."—*Vide Gas Referees Reports*, 1869 and 1871.

There are now Eleven Sizes of these Burners, Nos. A to H, J, K, and N, giving a light from 8 to 45 Candles, according to size.



The Patent "Christiania" Self-regulating Flat-flame Burner, fitted with Albatrine Globular Shade, gives a light equal to three ordinary Fishtails.

The Registered "City" Screw-regulating Flat-flame Burner is the best for Open Lights—Warehouses, Railways, Kitchens, Passages, &c.

The above Shades may also be had in Plain White Albatrine.

PRICE LISTS AND PARTICULARS MAY BE HAD POST FREE OF THE MANUFACTURER & PATENTEE,

WILLIAM SUGG,

GAS ENGINEER,

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CATHELS'S Patent Gas-Washer is an excellent cleanser of gas from tar, ammonia, sulphur, and carbonic acid, reducing the cost of subsequent purification 30 to 50 per cent. Needs no motive power or attention beyond drawing off and recharging as required. Has no moving parts or complications to get out of order. Is of moderate cost, and is practically indestructible.

Application to be made to the MANUFACTURERS, the Horseley Company, Tipton, STAFFORDSHIRE.

GARSIDE'S IMPROVED MAIN DRILLING CLIP.

No. 1 takes from 2-in. to 6-in. Mains.
No. 2 takes from 6-in. to 12-in. Mains.

GARSIDE'S REGISTERED TUBE-VICE takes ⅜ brass to a 2-in. Socket.

May be had direct from the maker, SAMUEL GARSIDE, Gatefield Iron-Works, ASHTON-UNDER-LYNE.

PRICE'S PATENT COKE & COAL BARROW

effecting a great saving of time, labour, and expense.

For particulars, price, &c., apply to Mr. E. PRICE, Inventor and Patentee, Gas-Works, Hampton Wick, MIDDLESEX.

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MANUFACTURE EVERY DESCRIPTION OF

GAS AND WATER FITTINGS;

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These Paints have been for many years extensively used in Her Majesty's Royal Dockyards, Woolwich Arsenal, the Shorncliffe and Curragh Camps, War Departments, and Colonies, and are largely supplied to Railway, Harbour, and GAS COMPANIES, Shipowners, Engineering Establishments, Railway Carriage and Wagon Works, and the Paint Trade generally. They are the BEST PROTECTORS of WOOD, CEMENT, and IRONWORK, even arresting corrosion after it has set in; and their base being oxide of iron, they are free from those properties which make lead paints so destructive to iron. They do not scale or blister, are not affected by great heat, and are the only Paints which will resist the effects of sulphuretted hydrogen. Their DURABILITY and covering properties have borne the test of A QUARTER OF A CENTURY'S PRACTICAL TRIAL.

The undermentioned colours—ground in best linseed oil, and requiring only to be thinned down for use in the ordinary way—are kept in stock:—

Torbay Brown.	Torbay Red.
Dart Green.	Slate.
Dart Yellow.	Buff.
Brixham Black.	Torbay Chocolate.
Light Blue.	Cream Colour.
Dart Brown.	Dart Umber.
Imperial Stone.	Light Stone.
Bronze Green.	Salmon Colour.
Navy Green.	Lead Colour.
Carriage Red.	Dark Stone.
Light Lead.	Crystal Palace Blue.
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All other Colours made to order.

READY-MIXED PAINTS.

A great variety of Colours ready mixed for the brush are also always kept in Stock, in 3 lb., 7 lb., 14 lb., and 28 lb. cans.

Prices and Testimonials on application.

ECONOMY IN THE PRODUCTION OF GAS.

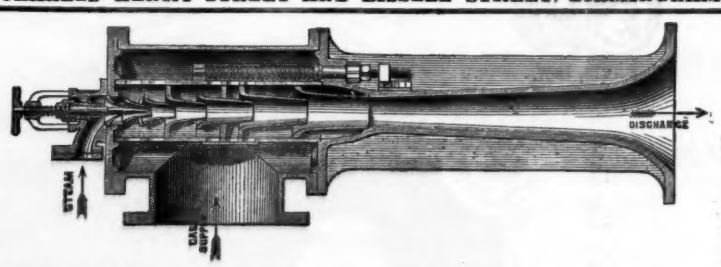
PLUTONIC CEMENT,

For Jointing and Repairing Retorts and Ovens *in* action and *out* of action.

A Pamphlet on the advantages of the above, with modes of Application, References, Prices, &c., free by post, from the Sole Manufacturer,

WILLIAM RICHARDSON, GAS AND HYDRAULIC ENGINEER,

CHARLES HENRY STREET AND BISSELL STREET, BIRMINGHAM.



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IMPROVED CLELAND'S PATENT.

UPWARDS OF 250 IN USE.

CLELAND'S PATENT CONDENSER AND STEAM SCRUBBER.

FOR PARTICULARS, APPLY TO

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OR TO

GERALD J. TUPP, 8, John Street, Adelphi, W.C., LONDON,

SOLE AGENT FOR ENGLAND AND WALES.

J. & J. BRADDOCK,

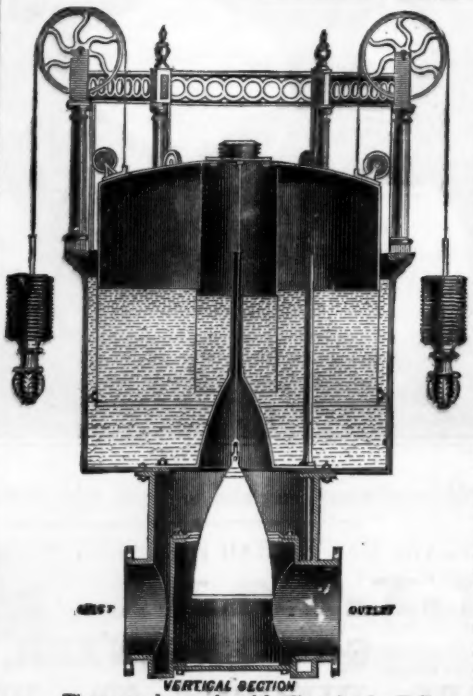
GLOBE METER-WORKS,

OLDHAM,

Beg to submit to Gas Engineers their

PATENT COMPENSATING GAS GOVERNOR,

Which is designed to give an uniform pressure at the Outlet to the Main at all draughts up to the full quantities which the Governors are made to control, such outlet pressure being less than the initial pressure.



VERTICAL SECTION

The uniformity of pressure is obtained by introducing a compensating chamber into the Bell or Holder of the Governor, which compensator is of the same area as the valve, both of which are operated on by the initial pressure, thereby placing the valve in equilibrium, no matter what the initial pressure may be. The action on the Bell is by the Gas passing along a pipe from the outlet, and the pressure is regulated by weights in connexion with the Bell as required.

From the sectional elevation attached hereto, it will be seen that only the Gas required to operate the Bell comes in contact with the water of the tank, which water will remain comparatively sweet and free from odour. That in case of accident to the Bell, no more Gas can escape than would pass up the pipe covering the valve-rod and Bell supply-pipe.

These Governors have been made and sent out of various sizes for from 2 to 24-inch Mains, and give most satisfactory results.

They can be made with Float in the Bell, or counterpoise as per section.

J. T. B. PORTER & CO.,

GAS ENGINEERS & MANUFACTURERS,

IRONFOUNDERS AND CONTRACTORS,

GOWTS BRIDGE WORKS,

LINCOLN.

LONDON OFFICES: 1, WESTMINSTER CHAMBERS, S.W.

ESTIMATES FOR GAS-WORKS OF ANY SIZE.

REFERENCES TO 500 WORKS ALREADY ERECTED.

N.B.—All Communications to be addressed to the FIRM ONLY.

BELGIAN CLAY RETORTS.

J. SUGG and CO., late ALBERT KELLER, GHENT.—The removal of the import duties on Earthenware permitting the entry of Clay Retorts into England, Messrs. Sugg, of Ghent, beg to draw the attention of the Gas Companies of London, and other Cities, to the very superior quality of the RETORTS manufactured by them. They can be made of any size, in one piece, and of any form. The price will be in proportion to the weight, and very moderate in comparison to their value.

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JAMES NEWTON & SON,
(Established 1820,)
FIRE-BRICK AND TILE MERCHANTS,
Wholesale and for Exportation,
FALCON DOCK, 78 AND 79, BANKSIDE,
SOUTHWARK, LONDON, S.E.,
DEPÔT for STOURBRIDGE AND NEWCASTLE FIRE-BRICKS, LUMPS, TILES, and FIRE-CLAY, and every Article suitable for
GAS AND WATER WORKS.

THE AMERICAN GAS-LIGHT JOURNAL.

A. M. CALLENDER & CO., Proprietors. G. WARREN DRESSER, Editor.

Issued Semi-Monthly at No. 42 Pine Street, New York City.

This Journal is especially devoted to Gas Engineering and Manufacture, and is the official organ of the AMERICAN GAS-LIGHT ASSOCIATION, and the NEW ENGLAND ASSOCIATION OF GAS ENGINEERS.

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THE WIGAN COAL & IRON COMPANY,

LIMITED.

DISTRICT OFFICE: 97, NEW STREET, BIRMINGHAM; AGENT: W. M'GOWAN;

Supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, &c.

N.B.—The Wigan Coal and Iron Company, Limited, are exclusive owners of the well-known HAIGH HALL AND KIRKLESS HALL GAS COAL COLLIERIES.

THE

SILBER LIGHT COMPANY, LIMITED,

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MANUFACTURERS OF SILBER GAS-BURNERS & FITTINGS.

No. 285.

The Times says: "A considerable improvement upon any burners of the same kind that have hitherto been constructed."

Dr. W. WALLACE, F.R.S.E., F.C.S., says: "After a careful study of the principles of the Argand, I have come to the conclusion that your burner is the best at present known."

The Silber Tubulated Gas-Burner.

No. 291.

The Silber Tubulated Gas-Burner, with Opal Shade and Cup and Governor attached.

The *Lancet* says: "Mr. Silber has obtained a light of singular steadiness, whiteness, and illuminating power, with the great additional advantage of such perfect combustion as to preserve the purity of the atmosphere."

The manager of the gas-works at Southport says: "When our gas is 18 candles with the Standard burner, the Silber gives it as 22. You ought to get it noticed by the gas managers at once."

No. 286.

The Silber Bat's-wing Gas-Burner

The Times says: "Besides the Argand burners, some improved Bat's-wing burners of different sizes were exhibited. In these there is an internal chamber permitting the expansion of the gas before it reaches the flame. They are constructed to burn from two to eight cubic feet of gas per hour, and the illumination they give ranges from 4 to 30 candles, a considerable improvement upon any burners of the same kind that have hitherto been constructed."

THE SILBER LIGHT COMPANY, LIMITED,

Are also Manufacturers of every description of Lamps for Railways, Ships, Streets, Churches, and Domestic Purposes.

IMPROVED
COMPENSATING GAS-METER.
HUNT'S PATENT.

This Meter supplies a want long felt, by putting an end to the loss sustained by Gas Companies through the overworking of their Meters.

EXTRACTS FROM REPORTS.

"I am able to report that the Meters have given in each test most satisfactory results."—*Mr. H. Sporne, City of London Meter Inspector.*

"I consider the arrangement is a great improvement upon the Meters in present general use."—*Mr. T. Jackson, Meter Inspector, Birmingham.*

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COPIES OF REPORTS SENT ON APPLICATION.

MANUFACTURED BY

JOHN BENT & SON,

WET AND DRY GAS-METER AND GAS APPARATUS MANUFACTURERS,

BELL BARN ROAD, BIRMINGHAM.

Established 1830.

C. & W. WALKER,
8, FINSBURY CIRCUS,
LONDON, E.C.

MANN & WALKERS' PATENT SCRUBBER.

By Letters Patent in Great Britain, Europe, and the United States of America.

By some important improvements recently patented, the purifying power of these Scrubbers has been much increased, and a stronger ammoniacal solution obtained, which is found to absorb a large portion of the carbonic acid contained in gas, effecting an important saving in money and labour in the lime purifiers, and where oxide only is used, the increase in the illuminating power of the gas obtained by these Scrubbers is shown in a remarkable degree, in consequence of the large quantity of carbonic acid removed from the gas.

It is to be particularly noted that the im- portant results of these Scrubbers do not depend upon the machinery alone. The entire internal construction of the Scrubber bears an almost equally important part. For this reason, where it is desirable to convert existing Scrubbers, whose dimensions happen to be suitable, the work commences by ripping out the whole of the interior of the shell, and beginning the internal construction *de novo* from bottom to top.

Fifty million cubic feet of gas per 24 hours are purified from ammonia by these Patent Scrubbers in a winter's day in the gas-works of London, where the purity of gas supply is the highest in the world, under the chemical restrictions of the Board of Trade.

Generally, wherever a high standard of purification is maintained in the chief cities and towns of the British Provinces and of Europe, these Scrubbers have become established.

By their use the department of purification from ammonia upon a gas-works is made complete, without the aid of prepared oxide of iron, chemicals in purifiers, or any other supplementary process, and the whole ammoniacal residual product contained in the coal is absorbed and obtained in the form most profitable to a gas company, while the requirements of all Acts of Parliament and of the Board of Trade, relating to incorporate gas companies, are satisfied.

Foul Gas, properly condensed, entering the inlet is, by once only passing through the Scrubber, completely purified from ammonia with regular certainty day by day, without any further trouble, or any other process, effected by a very small quantity of clear water let into the machinery room at the top of the Scrubber, which is discharged at the liquor outlet at the bottom, from Newcastle coal at about 18 to 20 ounces strength, from Yorkshire and other coals, generally from 25 to 30 ounces strength; while acidulated litmus or turmeric exposed at the Scrubber outlet will not show the slightest discoloration, and there is not a quarter of a grain of ammonia per 100 feet left unabsorbed.

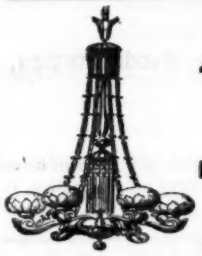
They contain their own engine power, re- quiring only a small inappreciable quantity of steam from the gas-works boiler, and are then complete in themselves, ready for service.

Applications relating to dimensions and prices should be addressed to us, C. AND W. WALKER, 8, FINSBURY CIRCUS, LONDON, E.C., or to Mr. WILLIAM MANN, late Superintendent of the Chartered Gas-Works, BLACKFRIARS, LONDON; they should state approximately the largest make of gas in 24 hours on a winter's day, and the smallest make on a summer's day, to be purified.

LESMAHAGOW CANNEL COAL.

FERRAND DAVIES,
148, GRESHAM HOUSE, OLD BROAD STREET, LONDON, E.C.,
SOLE AGENT FOR
THOMAS BARR'S LESMAHAGOW MAIN CANNEL.

Quotation and Analysis forwarded on application.



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MANUFACTORY AND SHOW-ROOMS:
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ESTABLISHED 1807.
MANUFACTURERS OF CRYSTAL GLASS CHANDELIERS
WALL LIGHTS, AND LUSTRES FOR GAS AND CANDLES.
TABLE GLASS OF ALL KINDS.
CHANDELIERS IN BRONZE AND ORMOLU. MODERATOR LAMPS.

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PATENTEE and MANUFACTURER of the following Inventions:—
RETORT SETTINGS—giving great Economy of Fuel.
STEAM-ENGINES and EXHAUSTERS, FOUR-WAY VALVES, WASHERS, SCRUBBERS.
FUEL-MACHINE, for Compressing Breeze and Tar.

N.B.—Pamphlet, with Eighteen Illustrations and Letterpress on the Construction of Gas-Works, post free, 2s. 6d.

PRICES AND ALL PARTICULARS TO BE HAD OF THE PATENTEE,
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GAS PURIFICATION.

BAILES & HALLSWORTH,
CONTRACTORS FOR THE
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PATENT OXIDE OF IRON COMPOUND.

The material is in use at most of the principal Gas-Works in Yorkshire and elsewhere. It contains considerably less moisture than natural Oxide of Iron. It is much cheaper and more efficient as a purifying agent.
B. & H. are purchasers of Spent Oxide, or will take Spent in exchange for New Material.
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GAS APPARATUS OF EVERY DESCRIPTION,
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Retort-Lids, Boilers, Cast and Wrought Iron Tanks, Iron Roofing, Bridges, Girders,
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N.B.—Estimates for all Gas Plant and Remodelling supplied on application.

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LOTHIAN'S CANNEL
Yields 12,500 cubic feet of 24-candle gas per ton, and 9 cwts. of excellent coke, containing only 4 per cent. of ash.

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Yields 12,160 cubic feet of 32·5-candle gas per ton, and 10 cwts. of excellent coke, containing only 5 per cent. of ash.

OLD WEMYSS CANNEL
Yields 13,320 cubic feet of 32·5-candle gas per ton.
Prices and full Analyses on application.

GAS COAL.

POPE & PEARSON, LIMITED, have now the authority of several of the most eminent Gas Engineers of London in stating that their Coal yields *in practical working over* 10,000 *cubic feet of gas, with an illuminating power of* 16 *candles;* or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.
One ton yields 12½ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.
For further particulars, apply to POPE AND PEARSON, LIMITED, West Riding and Silkstone Collieries, near LEEDS.

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The Subscriber is prepared to contract for the supply of all the principal SCOTCH CANNEL COALS. Prices and Analyses of the various Coals will be forwarded on application.

JAMES M'KELVIE,
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Established 1840.

CLOTH GAS-BAGS FOR MAINS.

As supplied to the Imperial, Chartered, and other London and Provincial Gas Companies. Bellows and Valves for inflating Well Dresses, Stokers Gloves, India-Rubber Suction and Delivery Hose, Gas-Tubing, Leather, India-Rubber, and Gutta-Percha Machine-Bands, Sheet and Washers, and Steam Joints.

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T. Stone, Esq., of Weymouth, writes on Nov. 17, 1876: "I have used about 12,000 tons of this Coal, with, I think, the best possible results, although not always under the most favourable circumstances. My Coal account made up to Midsummer last showed a makeage of 10,594 cubic feet per ton of 14¼-candle gas, and not a hundredweight of Cannel used. This statement would, I know, be incredible to many men, and may provoke the remark, 'How much of it is paid for?' For the gratification of such, I have to say that, of the above quantity, 9866 cubic feet per ton of Coal carbonized were brought to charge and duly paid for, with the exception of about 6s. per cent. for bad debts. The coke is of excellent quality. The above facts I hold to be a greater recommendation to your Coal than any words of mine could be."

PRICES ON APPLICATION, EITHER F.O.B. OR BY RAIL IN TRUCK LOADS.

THE TYNE COAL COMPANY, LIMITED, OWNERS.
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NEAR NEWCASTLE-UPON-TYNE,
Manufacturer of
CLAY RETORTS, FIRE-BRICKS, AND EVERY DESCRIPTION OF FIRE-CLAY GOODS

GRIRDROD'S PATENT PORTABLE PIPE SCREWING MACHINE,

For 1 in., 1¼ in., 1½ in., and 2 in. Gas Threads, complete £7 10s.
In use at the chief gas-works, and giving great satisfaction.
For other useful goods, see Bailey's "Illustrated Inventions," post free 3s. 6d.; gratis to ledger customers.

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Brassfounders, Gauge Injector and Tool Makers,
ALBION WORKS, SALFORD,
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Established

1795.

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THE ORIGINAL

WORTLEY FIRE-BRICK WORKS,

NEAR LEEDS,

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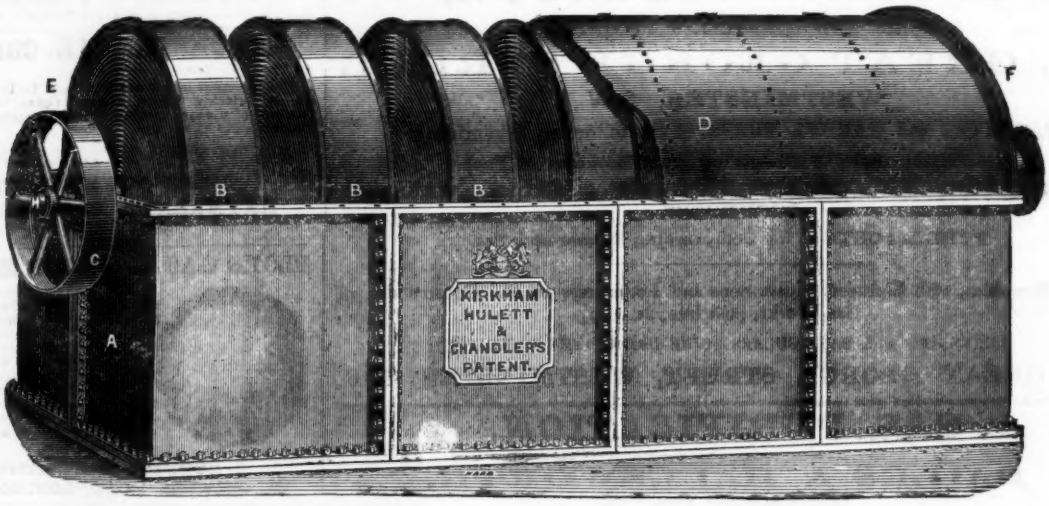
LIVERPOOL: Back Leeds Street.

SPECIAL NOTICE.—Our Patent Machine-made Retorts have now been in *actual work* nearly 1000 days, and are yet in good order. References on application.

July 2, 1877.

STANDARD WASHER AND SCRUBBER.



The advantages of the Apparatus will doubtless be understood by those interested in gas manufacture.

The principal points of any Apparatus for the extraction of ammonia may be summarily stated as follows:—

1. **A large amount of Surface is desirable.**
2. **Such Surface should be always effectually Wetted.**
3. **The Surfaces or Scrubbing Material should cause no Pressure.**
4. **The Gas should meet various strength Liquors on its course.**
5. **However small the quantity of Water used, it ought to operate over the whole Surface.**
6. **Changing Scrubbing Material is both Objectionable and Expensive.**
7. **Economy both as to Space occupied and Cost of Apparatus is an important item.**

All these requisitions are supplied by the above Apparatus, of which the following is an explanation:—

A is a cast-iron tank, formed into several separate water-tight compartments.

B B B volutes of sheet iron fitted to the centre shaft, which is driven by the pulley, C, and causing the said volutes to revolve each in a separate compartment filled with water or other fluid.

D, the cover, has partitions fitted into it corresponding with those in the tank, sufficient space being left between the top of the partition in the tank and the lower edge of that in the cover, to allow the gas a free passage through the first volute to the second, and so on to the third, fourth, &c.

The action is as follows:—The crude gas entering at E is partly washed in the first compartment, which becomes 10 or 12 oz. liquor, or stronger if required, according to the quantity allowed to enter per ton; the gas then passes to the second, where the liquor is of a less strength; thence into a weaker liquor, as it passes from one compartment to the other, finishing at the last compartment or outlet, F, with clean water, which is constantly flowing and running over from one compartment to another, until it reaches the last space, from which it flows from the outlet-pipe into the well or tank ready for sale or removal.

Taps are inserted in each compartment for the convenience of drawing liquor for testing, &c.

Applications as to Cost, &c., may be obtained of either

Mr. D. HULETT, 55 & 56, HIGH HOLBORN;

Messrs. KIRKHAM & HERSEY, GAS ENGINEERS, 21, ABINGDON STREET, WESTMINSTER;

Or Messrs. CHANDLER, 104, NEWINGTON CAUSEWAY.

Inquirers will please state their Maximum Day Make.

THE SILKSTONE & DODWORTH COAL & IRON COMPANY, LIMITED,

DODWORTH, BARNSLEY.

BENJAMIN WHITWORTH, Esq., M.P. . . . . Chairman.
Mr. RICHARD HARTLEY . . . . . Managing Director.

REAL OLD SILKSTONE GAS COAL.

JAMES PATERSON, Esq., Gas Engineer, of the Warrington Gas Company, reported, Aug. 10, 1875:—

"This Coal possesses remarkable qualities as a gas and coking coal, and appears SECOND TO NONE IN THE KINGDOM. It contains the large quantity of 699 lbs. of illuminating matter, and 1498 lbs. of coke to the ton, and produces **12,240** cubic feet of 16·66 candle gas."

The above Company are raising nearly a thousand tons of the Real Old Silkstone Gas Coal per working day.

PRICES QUOTED TO ANY RAILWAY STATION, OR F.O.B. HULL, GRIMSBY, GOOLE, KEADBY, LIVERPOOL, AND FLEETWOOD.

GAS PURIFICATION & CHEMICAL Co., LIMITED,

(Successors to JOHN WILLIAM O'NEILL & CO.,)

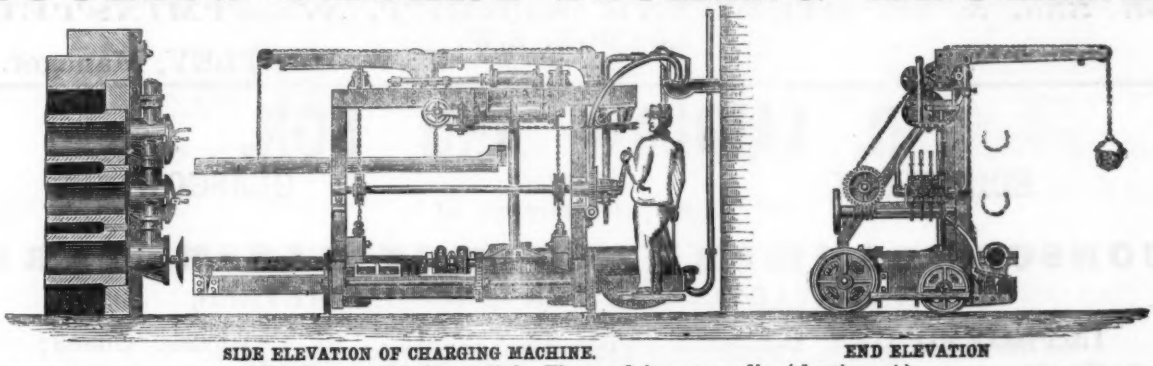
Offices—PALMERSTON BUILDINGS, OLD BROAD STREET, LONDON, E.C.,

CONTRACTORS FOR GAS PURIFICATION BY OXIDE OF IRON.

The superiority of the material supplied by this Company is generally recognized, and it is now in use in nearly all the London and most of the large Provincial Gas-Works.

JOHN WILLIAM O'NEILL, SAMUEL H. JOHNSON, } Joint Managing Directors.

FOULIS'S PATENT STOKING MACHINE.



SIDE ELEVATION OF CHARGING MACHINE. END ELEVATION

(The Drawing Machine will be Illustrated in next week's Advertisement.)

Makers: TANGYE BROTHERS and HOLMAN, London and Birmingham; ADAM WOODWARD and SON, Manchester; ROBERT LAIDLAW and SON, Glasgow; MASCHINENBAU-ACTIEN-GESELLSCHAFT HUMBOLDT, Kalk bei Deutz;
Or all particulars may be had from JAMES WOTHERSPOON, 31, St. Vincent Place, Glasgow.

NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS AND COLLIERIES,

NEAR SHEFFIELD.

CELEBRATED SILKSTONE GAS COALS.

The various descriptions of Gas Coal produced from the above Collieries possess an unequalled reputation, combining in a large degree the constituents essential for the production of the best quality of Coke and Gas of a high illuminating power.

A recent extensive development of the Collieries enables us to offer increased supplies.

JAS. PATERSON, Esq., of Warrington, after testing various qualities of our Coal, has sent the following testimony of their merits:—

"Warrington Gaslight and Coke Company,
Offices, Mersey Street, Warrington, April 23, 1877.

"MESSRS. NEWTON, CHAMBERS, AND CO.,

"GENTLEMEN,—After carefully testing the various samples of Gas Coals sent from your Collieries for analysis, I have pleasure in reporting them as belonging to the highest class of Gas and Coking Coals.

"The average of Nine samples gives a yield of **12,500** cubic feet of **15½**-Candle Gas, being equivalent to **664** lbs. of sperm per ton, and **1420** lbs. of fixed carbon of a very superior quality. All the samples bear a close relation to each other in value.

"Yours truly, "JAMES PATERSON."

Full particulars will be sent on application to us—address as above.

NEW PATENT WET GAS-METER,

THE "RELIANCE,"

MANUFACTURED BY THE

GAS-METER COMPANY, LIMITED,

238, KINGSLAND ROAD, LONDON; UNION STREET, OLDHAM; HANOVER STREET, DUBLIN.

The object attained by this invention is the *correct measurement of Gas under every fluctuation of the pressure.*

Accuracy is obtained by subjecting the whole of the water which determines the measuring chambers of the drum to one uniform even pressure, and so prevents unequal displacements of the water-line.

The "RELIANCE" METER has been tested by several of the most experienced official meter inspectors. Copies of their reports may be obtained on application to the

GAS-METER COMPANY, LIMITED,

238, KINGSLAND ROAD, LONDON.

MR. A. VERNON HARCOURT'S COLOUR TESTS,

FOR BISULPHIDE OF CARBON, SULPHURETTED HYDROGEN, AND CARBONIC ACID IN COAL GAS.

The usual method by which the quantity of sulphur in coal gas is determined demands much time and considerable manipulative skill, as well as expensive apparatus. With Mr. Harcourt's Apparatus a test may be easily made by any intelligent person within a quarter of an hour, and the quantity of sulphur in any sample of gas ascertained within two or three grains per 100 cubic feet.

The Tests for Sulphuretted Hydrogen and for Carbonic Acid are equally simple.

THIS APPARATUS OUGHT TO BE POSSESSED BY EVERY GAS COMPANY.

Descriptive Particulars sent on receipt of 2d. in Stamps.

ALEXANDER WRIGHT & CO.,

GAS-METER AND APPARATUS MANUFACTURERS,

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F. W. HARTLEY, Manager.

R. LAIDLAW AND SON,

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Manufacturers of

CONSUMERS IMPROVED WET GAS-METERS,

THE UNVARYING WATER-LINE GAS-METERS,

IMPROVED DRY GAS-METERS, in Cast-Iron or Tin-Plate Cases;

STATION-METERS, ALL SIZES, up to 15 feet Square, with PLANED JOINTS;

Experimental Meters, Photometers, Pressure-Gauges,

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MANUFACTURERS OF

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HYDRAULIC CRANES & HOISTS,

Effecting an IMMENSE SAVING in the cost of discharging Coals from Vessels, Barges, &c.

HYDRAULIC RAMS FOR LIFTING AND LOWERING PURIFIER COVERS.

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PARK WORKS, GATESHEAD.

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GLASGOW OFFICES: 54, ST. ENOCH'S SQUARE.

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